A Database Publication

THE MICRO USER

Volume 5
Number 7
September 1987
£1.25

Top-selling guide to the BBC Micro!

ARCHIMEDES
Tapping the power of the super micro

INNOVATION
First entries in our great contest

HAC MAN
Lots more lives for less effort

UTILITY
Disc copying breakthrough

PEDOMETER
How to measure maps electronically

CLASSIFIEDS
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- Hybrid Music System
- Advanced control panel
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COMPATIBLE WITH THE BBC B, B+, MASTER SERIES, AND ACORN ELECTRON

CODENAME: DROID

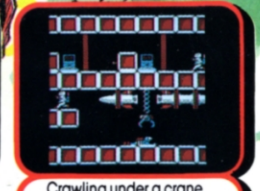
Stryker's Run – Part 2

The Dramatic Loading Screen

Climbing up a rope (SURFACE DEFENCE)

Flying with a jet-pack (ANCIENT SHRINE)

The elusive "Herbert" Droid (CREW'S QUARTERS)


Crawling under a crane (MISSILE FACTORY)

Commander John Stryker is back in CODENAME: DROID

Stryker's Run was one of our most successful releases of 1986. It stayed at the top of the BBC Micro software charts for six weeks and received several glowing reviews: "The graphics are stunning . . . This should be in every collection" enthused A & B Computing.

Now CODENAME: DROID presents a new challenge for Commander John Stryker. He has been commissioned by the Allied Nations to undertake another perilous mission in their continuing struggle against the warmongering Volgans.

His task is to locate and seize the Volgans' latest weapon: a new spacecraft (codenamed the Z11) which is equipped with the revolutionary matter/anti-matter warp drive facility. Stryker must land on the mysterious planet Volga, penetrate the Volgans' underground defence systems, find the spacecraft and requisition it.

As Stryker descends below the planetary surface, he will pass through 4 different zones of Volgan activity:-

- The Surface Defence — an array of steel girders, ropes and chains lies coldly between the crusted white rock walls.
- The Ancient Shrine — a stone-walled temple bedecked with hideous gargoyles and rusting chandeliers.
- The Crew's Quarters — the Volgans' relaxation area: tables and chairs are arranged invitingly amongst the essential ventilation pipes.
- The Missile Factory — clinical psuedo-metallic walls surround the missiles, bombs, and computers of the evil Volgan race.

Your character in the game can jump, run, kneel, crawl, climb up and down ropes, fire his laser blaster and drop mines. He can also fly for short distances using his jet-pack, and access information via his wrist terminal computer.

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The screen pictures show the BBC Micro version of the game.
The graphics of the Acorn Electron version are indentical.

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If you complete the entire CODENAME: DROID mission, you can enter our competition.
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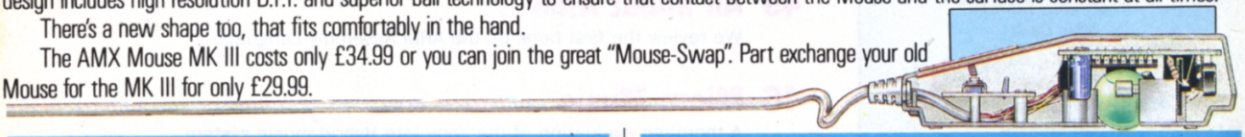
The AMX Mouse MK III costs only £34.99 or you can join the great "Mouse-Swap". Part exchange your old Mouse for the MK III for only £29.99.



*SUPERART

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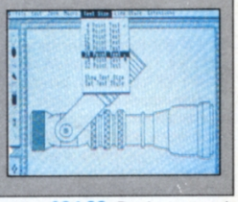

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The Micro User welcomes program listings and articles for publication. Material should be typed or computer-printed, and preferably double-spaced. Program listings should be accompanied by cassette tape or disc. Please enclose a stamped, self-addressed envelope, otherwise the return of material cannot be guaranteed. Contributions accepted for publication will be on an all-rights basis.

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Commander Stryker wants YOUR help!

Design a new mission for intrepid John Stryker. That's the challenge for readers this month. And there's £500 worth of prizes for the winners.

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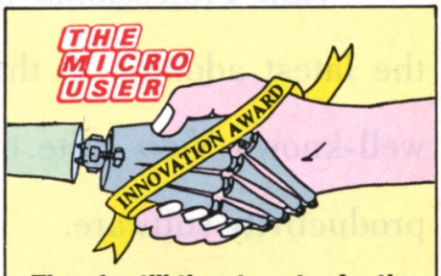

There's still time to enter for the coveted Micro User Innovation Award – and win the revolutionary Archimedes. Some of the entries received so far are reported on Page 15. Award details are on Page 67.

Save money on bargain offers from fellow readers

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NEXT MONTH

GAME
Go into space with Arena
UTILITY
Design pages with MicroWorks
MUSIC
Putting Ample to the test
REVIEWS
KXP-1081 Printer
The Genie

THE MICRO USER

October issue on sale September 2.

WE'RE ABOUT TO CHANGE YOUR VIEW OF WORD PROCESSING.

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Easy to use, View Professional is suitable for the BBC B, B+, Master 128 and Master Compact and costs £99.95. A version for Archimedes will be available later in the year. View it now at your local Acorn dealer.

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V I E W P R O F E S S I O N A L

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Or contact: Vector Services Limited, 13 Denington Road, Wellingborough NN8 2RL. Tel: 0933 79300.

THE MICRO USER NEWS

High-tech knitting

PEOPLE who live where some of the world's finest hand-knitted goods are produced are enjoying a new high-tech approach to the activity.

The Knitwear Designer suite of programs from Database encourages people to produce their own money-saving sweater patterns on the BBC Micro.

And it has had a big impact on knitting enthusiasts in the Scottish islands, traditional home of top quality sweater production.

Residents of the Shetlands, Orkneys and Hebrides have been ordering the Knitwear Designer package.

"Yes, we are famous up here for our knitwear", said Jill Deas who lives on the Isle of Harris, "but perhaps this computer program can teach us a thing or two".

Details of how to obtain the five-program suite are on Page 135.

Price cuts

ACORN has cut the prices of its Master range by an average 15 per cent.

And with the cuts has come a promise of continued support for the range despite the recent release of the Archimedes.

An Acorn spokeswoman said: "We see our whole range as very much a family, with each little group being supported".

The Master 128 now retails at £399 (it was £435), the Master ET at £329 (£348), the Master Compact Entry System at £349 (£385) and Compact with TV UHF modulator £363 (£399).

The largest cuts come on the Compact packages with monitors. With monochrome it now costs £399 (£469) and with colour £549 (£599).

Archimedes takes off

SIX-figure sales within the year are forecast by Acorn for its new Archimedes range, such is the interest in the superfast machine.

Fascinated callers from all parts of the globe are clamouring to know more about the world's fastest micro.

Already, the Acorn headquarters in Cambridge has been bombarded with calls from people keen to get their hands on the technological breakthrough.

An Acorn spokeswoman said advance orders and "serious" inquiries gave the company confidence in its 100,000 prediction.

She said that the education and business departments had been handing a steady stream of inquiries.

There had also been a substantial number of home users on the line, wanting to know that what was being said about the Archimedes was true.

People have been ringing from as far away as Holland, the Middle East and New Zealand.

Acorn says the 300 series will be targeted mainly at schools and colleges. Indeed, education departments of Britain's local authorities are spending the summer holidays assessing their budgets to see how soon they can afford to buy Archimedes.

This follows a special launch for education representatives.

Software houses have been quick to take an interest and a bevy of specially-written programs are expected around the time of the first shipping.

RESEARCH ASSISTANTS WANTED

READERS of *The Micro User*, particularly those with programming skills, have a chance to play an important role in major research.

Their expertise could assist psychology professor Pat Rabbit with his long term study of memory and ageing.

Based at Manchester University, he uses a BBC Micro to run tests which help him measure people's IQ and time their recall processes within one thousandth of a second.

The project has been under way for some time and funding from various research councils ensures it will continue at least until 1992.

It is a massive undertaking. Prof Rabbit has 1,700 volunteers in the Manchester area, and another 2,100 are helping a satellite research group based at Newcastle upon Tyne.

"But we are always in need of fresh minds", he told *The Micro User*. "The current stage of the project alone will require 400 volunteers.

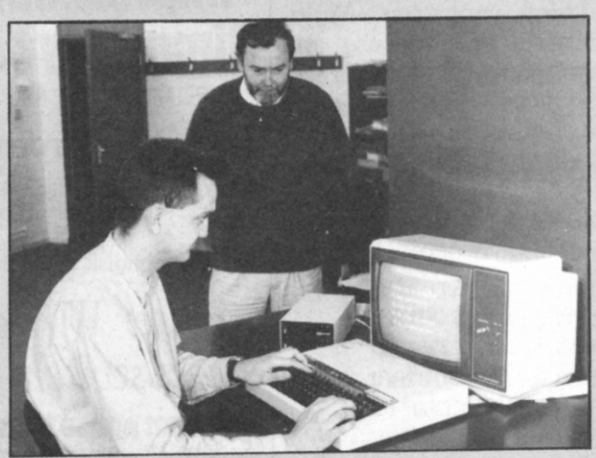
"I'm also looking for enthusiastic BBC Micro programmers interested in collaborating with us.

"We're very grateful to the Beeb, but have been frustrated by our lack of programming ability – particularly when devising tests.

"The trivial pursuit style games we've designed have been much better than monotonous forms of testing, but we feel we could improve them even further given the right assistance.

"If any readers of *The Micro User* would like to get involved in this research project – and provide their programming skills – I'd be pleased to hear from them on 061-273 8624.

"Who knows, they may even achieve fame through the publication of our findings in research journals"



Professor Pat Rabbit watches research assistant Tim Perfect trial a new memory test

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This is BOLD
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Fontaid	**£30.00**
Fontaid with 6264 RAM	**£36.00**
Font Discs A, B, C, D, EA & Lang each	**£15.00**
Inform	**£20.00**

PRINTERS

Delivery on all printers is free. Ring for a sample printout, specification and the latest prices.

The following Near Letter Quality printers all come with centronics interface, friction and tractor feed.

Panasonic KXP1081	**£180.00**
Canon PW1080A	**£270.00**
Star NL10	**£260.00**
Star NX15	**£410.00**
Star NB24/10 (216cps)	**£599.00**
Juki Daisywheel	**£330.00**

Free delivery on printers

CJE Printer packs

The CJE packs include: Cable, delivery, paper, plug, utility software and booklet. Please ask for further details.
The Printer packs cost £15.00 with printer: e.g. NL10 + pack = £260 + £15 = £275 inc. VAT.
BBC Cable if purchased separately is £8.00. Software on its own: £11.00 + £1 p&p.

NEWS

Clares back Archie

LEADING third party supplier Clares Micro Supplies is giving its fullest support to the new Archimedes.

The company has been involved in the Risc project from an early stage, producing three support programs of its own and developing products – including an application package – for Acorn.

"We will be supporting the Archimedes range with programs in areas where we have traditionally been strong", company head Dave Clare told *The Micro User*.

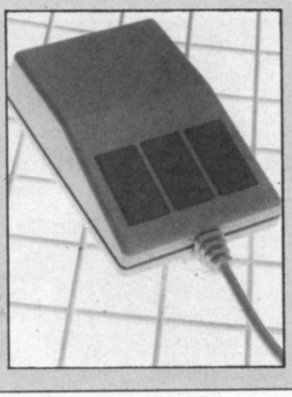
Already Clares (0606 48511) has developed three products for the new machine – the Archimedes Toolkit Module, full feature database Alpha Base, and sophisticated art package Artisan.

The toolkit module was developed by Michael Shaw, the programmer responsible for the acclaimed Ramrod toolkit for the BBC 6502 range. It is loaded from disc and resides in the relocatable module area.

The module uses a novel method to select the required editor, allowing the user to configure the module so he enters at a particular address, using preferred colours and his preferred editor.

If he wishes to use a different editor he selects this using a control key sequence.

Enter a Swiss super mouse



A WORLDWIDE search for a worthy successor to its famed AMX Mk II Mouse, has ended with Advanced Memory Systems plumping for Swiss technology and precision craftsmanship.

The AMX Mk III Mouse has been designed to the company's specification for use with the BBC Micro and Master series.

A unique patented design includes high resolution 250 dots per inch and advanced ball technology so that surface contact is constant at all times. Its new streamlined shape provides a more comfortable fit in the user's hand.

"With sales of over 60,000 for its predecessor and wide acclaim from users, I'm confident the AMX Mk III Mouse will be a very big cheese indeed", said Nick Pearson, managing director of AMS (0925 413501).

The new mouse costs £34.99, or £79.99 complete with art and desktop publishing packages.

GOODBYE TO MUSIC 7000

A DISPUTE between Hybrid Technology and Peartree Computers over product titles has ended with Peartree promising to rename its latest release.

Hybrid technical director Chris Jordan told *The Micro User:* "Peartree's recent announcement of a Music 7000 synthesiser caused much confusion among the public and media.

"Due in part to Hybrid's wide use of 'Music thousand' names for its add-ons like Music 5000 synthesiser and Music 4000 keyboard, many people assumed Music 7000 was a Hybrid product – and in particular a development of the Music 5000.

"The fact is that Music 7000 is entirely unconnected with Hybrid – we have not contributed to its development, beyond designing the Acorn Music 500 on which it is based.

"It is not a successor to the Hybrid Music 5000 synthesiser – centre of the Hybrid music system – or any development or improvement of it.

"It contains no Music 5000 software or facilities, nor any new version of the Ample language. The Ample software it does include is the original Acorn Music 500 Ample cassette".

Jordan added that in return for Hybrid agreeing not to take action, Peartree has given an undertaking to change the name of Music 7000 to remove confusion.

Processor emulator launched

A CLEVER new software device for emulating a processor has been released by Lancaster Consultants.

With ICE-King a BBC Micro can be turned into a complete development system for 6502-based target computers.

It consists of an 8k eprom and a pad with flat cable connectors which can plug into any sideways rom socket. The interface plugs into the 1MHz bus, and a second 40-way flat cable ends in a 40 pin dil plug which substitutes for a 6502 in the target system.

Users can run single-step or breakpoint programs which can be resident either in the BBC Micro's own ram or in the target system's rom.

In single-step mode the system gives a full display of both the next instruction to be executed and the processor's registers.

An interrupt is signalled to the user by a change of colour. In free-run mode the configuration responds normally to interrupts.

The system includes disassembler, memory inspect/change, and other features. Price £250 from Lancaster Consultants (0524 732431).

Romboard 4 takes a bow

A USEFUL addition to the Master has been announced by Vine Micros. Called the Romboard 4, it offers another method of locating more rom-based programs into the machine.

From the same designer as Romboard 3, it can support four new roms, the user choosing whether these are to overlay the ram banks or the cartridge slots.

Various combinations can be set by altering links to suit personal requirements. By using both Romboards together an extra seven roms may be introduced into the Master, including the Inter series by Computer Concepts.

A read/write protect switch is fitted as standard and Vine Micros (0304 812276) can supply further switches to link into either board, allowing reaccess to any overlaid utility from outside the computer.

Romboard 4 costs £29.95.

NEWS

Now the Desktop Oscars

THE desktop publishing sector of the UK computer industry – estimated to be worth £300 million by 1988 – is to have its own version of the Oscars.

And one of them will be a special award for the best DTP work produced on a BBC Micro or Master.

Acorn Computers is donating an A305 BBC Archimedes colour system worth £1,146 to mark this particular achievement.

Pira, the UK technology centre for the printing and publishing industries, will sponsor the main awards.

Winners will be announced at The Desktop Publishing Show 1987 at London's prestigious Business Design Centre from October 15 to 17.

There will be three main award categories – newspapers and magazines, company reports, and leaflets, newsletters and brochures.

In each case, all the work must have been "predominantly produced" using a desktop publishing system. A panel of experts drawn from the design and print fields will make the final decisions.

Entries – consisting of one example of desktop publishing accompanied by full details of the production methods used – must be received not later than noon on Thursday, October 1.

Further details of the awards can be found on Page 72.

Fast on the draw

LATEST product from Bizzell Computers for the BBC Micro is a plotter, digitiser and printer CAD package.

The hardware is a fast drawing A4 sized flatbed plotter with built in centronics and RS232 interfaces. Price is £346.96.

Wind-powered micro becalmed

JOHN Pedersen, the Jack-of-all-trades from Tyneside who planned to sail round the world with a BBC Micro for company, has had to abandon the venture.

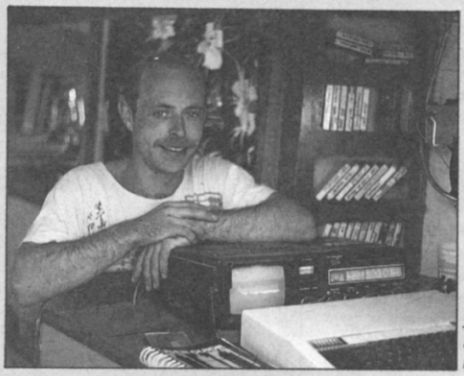
Problems with the sails on his 30ft trimaran Chikor forced him to return to England before he could reach the Azores and strike out across the Atlantic to South America.

But one success of John's curtailed voyage was his BBC Micro – powered by a car battery system designed by Mike Cook, technical editor of *The Micro User*.

The Chikor has no engine and electricity is supplied by two large car batteries charged by a wind generator.

The main power consumer is the self-steering unit – a compass with electronic sensors and a robot arm which pulls the tiller back and forth.

Both the generator and robot arm produce electrical spikes that John needed to separate from the computer supply.



John Pederson afloat with his BBC Micro

The prototype circuit that adapts the BBC Micro to operate on a 12v supply was designed by Mike Cook to absorb spikes up to 40v.

To be on the safe side, John decided to use one battery for the generator and autohelm and one for the BBC Micro and monitor.

He wasn't able to use his disc drive, as this needs a stable 12v supply – difficult to obtain from a car battery which usually outputs approximately 13.5v. So he used tape instead.

"Before I set out next time I want a shortwave transceiver as well", John told *The Micro User*.

"With just a little more wiring and programming you'll be seeing the occasional message on MicroLink sent from somewhere in the Atlantic.

"I could also so with a better monitor – I bought the cheapest working TV I could find in Gibraltar – and I'll have to get the disc drive going.

"But before that I need a new jib and storm jib or I won't be going anywhere".

Domesday package

FOLLOWING an agreement with Acorn Computers, Granada Microcare is to provide an after sales warranty service for the BBC Domesday system.

Granada will provide field service and workshop support for the package on a nationwide basis.

Customers include the Science Museum at South Kensington, the British Library and the BBC headquarters at Shepherds Bush.

The contract is an extension of an earlier agreement with Granada to provide Acorn dealers with a workshop repair service for the BBC Master Compact.

BBC's Archimedes choice defended

ACORN and the BBC have hit back at British Micro Federation critics who attacked the Corporation for endorsing the computer maker's latest product.

The A300 series of the new Archimedes has the familiar owl and BBC badge on its keyboard – a move which has angered some members of the BMF.

Leading the criticism is BMF chairman David Fraser who describes the continued endorsement as "unholy".

His organisation suggests the BBC should be endorsing MSdos as a universal operating system rather than Acorn machines. However, David Fraser is also head of Microsoft UK – part of the company which produces MSdos.

Acorn public relations director Michael Page said the criticism showed a lack of knowledge of what his company's computers were used for in schools.

A BBC spokesman pointed out that the BMF had made its criticisms without investigating the views of the education world.

"And don't forget that this machine does not exclude MSdos – a simple add on allows the users to run the operating system's programs," said the spokesman.

Archimedes Software

Over the past five years Computer Concepts have gained a reputation for leading the software market from the age of the Model-A to the Master Compact. We intend to produce a wide range of quality software for the Archimedes including completely new and original applications and utility software.

INTER-series

Our most popular products have been converted to operate on the Archimedes. Each of these will be available as a full package and, to current owners of the existing ROM versions, as a low-cost upgrade. Files created on the BBC Micro (ADFS 3.5") are immediately compatible with the Archimedes versions. The products available are:-

WORDWISE PLUS

40-column word processor. Features text segments and a full programming language. Very flexible, allowing label-printing, multi-column printing, etc. The most popular word processor for the BBC Micro.

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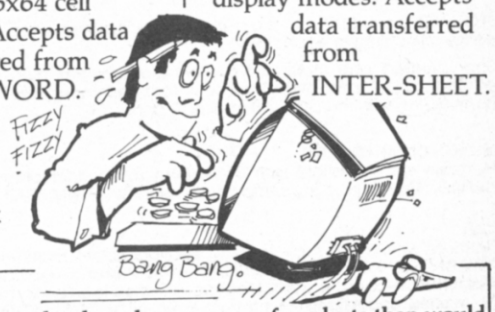
INTER-SHEET

Spreadsheet. Operates in 40/80/132 column display modes. Allows up to 255x64 cell matrix. Accepts data transferred from INTER-WORD.

INTER-WORD

'WYSIWYG' word processor. Operates in 40/80/120 character display modes. Accepts data transferred from INTER-SHEET.



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Writing good software for the Archimedes requires teamwork. In order to develop a larger range of products than would usually be possible, we are looking for competent, experienced programmers. We can offer either fixed contract work or full-time employment. Products developed by us or for us must be of the highest quality and, to this end, all programming *must* be undertaken *purely* in ARM assembly language. Interested applicants are invited to apply (in writing only please) to the 'Manager' at the address below.

If you want to be kept up-to-date on the forthcoming Archimedes products then please write or phone for details.

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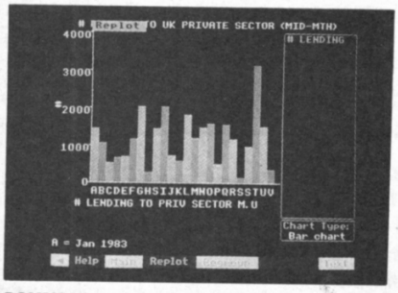
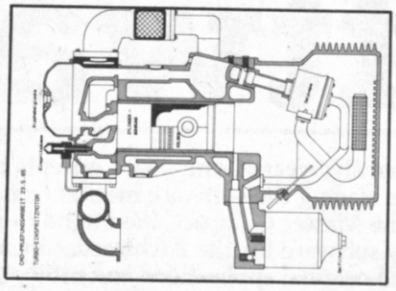
Every PLOTMATE picture tells a story



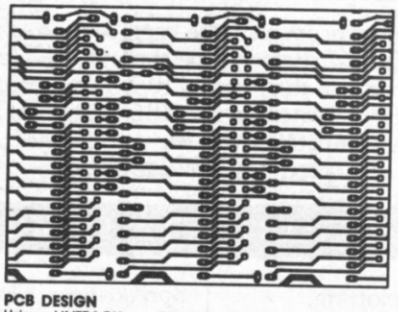
DOMESDAY
A typical bar chart from the Domesday database. Hard copy is obtainable via the Plotmate BBC Welcome disk.



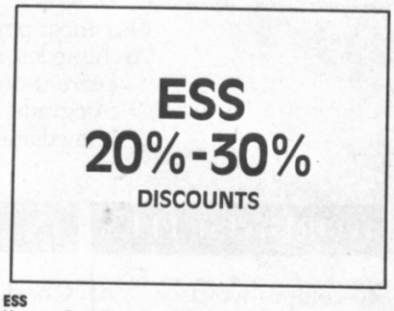
CAD
Example from SUPERDRAFT running on the NIMBUS.

DIGITISING
Map of Europe digitised and edited using LINMAP software.

IMAGE SCANNING
Linscan screen file of 'MONA LISA' incorporated into AMX PAGEMAKER.



PCB DESIGN
Using LINTRACK, a Printed Circuit Board design package.



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Plotmate is compatible with all leading micros including the BBC, NIMBUS, IBM PCs and PC compatibles, such as the AMSTRAD PC1512.

CAD
Plotmate runs from many leading BBC packages including BITSTIK, AMX DESIGN, the REALTIME GRAPHICS SYSTEM and LOGOTRON LOGO. When the on-board graphics language range is extended, Plotmate 'M' models understand commands from HPGL 7475A/7470A industry standard languages enabling compatibility with a wide range of professional third party software including AUTOCAD, AUTOSKETCH, SUPERDRAFT, SCRIBE MODELLER and MICRODRAFT.

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LINTRACK is a sophisticated, low cost, CAD package which allows the creation and revision of printed circuit board artwork. BBC, Nimbus, IBM PC and Amstrad PC1512 versions available.

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The LINSCAN range of image scanners can create image files for most popular Desktop Publishing and Art packages.

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ALDUS PAGEMAKER and NEWSPAPER can use image files from Linscan (for the Nimbus).

GEM PAINT, XEROX VENTURA PUBLISHER, and GEM DESKTOP PUBLISHER can utilise image files created by Linscan (for IBM PCs and PC compatibles).

DOMESDAY
All Plotmate Welcome disks allow WRITE Files containing tabular data from the Domesday database to be reprocessed in pie, bar and line chart format on the BBC Master.

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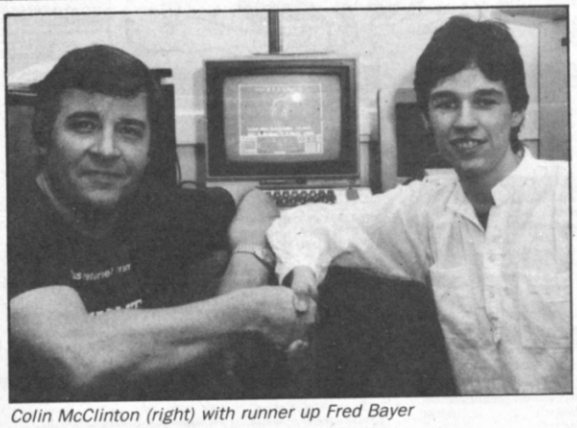

Colin McClinton (right) with runner up Fred Bayer

Colin joins the world's élite

AMID rumours that an Archimedes version of the BBC Micro cult game is in the pipeline, the Elite world championships have resulted in victory for Britain over the USA.

Firebird's London headquarters was buzzing with the story that Ian Bell and David Braben are working on Elite II for the Risc machine, as 19-year-old Colin McClinton from Belfast beat Fred Bayer, an independent film-maker from Oregon, after a mighty eight-hour battle.

Colin earned his right to compete at the London play-offs as long ago as March last year. Fred fought through a similarly close-contested American competition.

Having already won prizes of software and foreign travel, the orders for Colin and Fred were simply to kill as much as possible – starting as Dangerous with a mere 3,000 credits and a single-beam laser.

Both players – fully aware that Elite success is met with increased danger that only vigorous trading and rearmament can handle – spent the early period trading furiously to gain weapons and shielding before they tried any serious mayhem.

At the lunch break things were about even, but as the afternoon wore on Colin began to demonstrate a ferocity increasingly hard to match. While Fred had a nifty turn of speed in a tight corner, he began to lose confidence against a sharper opponent.

With an hour still to go, Fred conceded defeat. Although his score of 255 kill points was impressive, Colin's was nearly twice this. The winner's reward is an expenses-paid trip to the USA later.

Watford splitter

WITH another simple but effective device for which it is famous, Watford Electronics has taken the worry out of trying to use two peripherals at the same time.

The need to plug in and unplug devices at the user port is ended with the release of The Splitter for the BBC Micro. It allows two devices – for instance Watford's Quest Mouse and Video Digitiser – to be connected to the user port simultaneously. A simple toggle provides the means of switching from one to the other and back again.

Price £15 from Watford Electronics (0923 37774)

THE GALLUP CHART TOP 20 BBC SOFTWARE

THIS MONTH	LAST MONTH	TITLE (Software House)	PRICE
1	1	Grand Prix Construction Set *Superior*	9.95
2	2	Phantom *Tynesoft*	7.95
3	•	Around the World in 40 Screens *Superior*	6.95
4	11	Paperboy *Elite*	9.95
5	3	Hercules *Powerhouse*	1.99
6	•	Dunjunz *BugByte*	2.99
7	4	Superior Collection Vol 1 *Superior*	9.95
8	5	Superior Collection Vol 2 *Superior*	9.95
9	8	Mini Office II *Database*	14.95
10	7	Micropower Magic *MicroPower*	7.95
11	8	Repton 3 *Superior*	9.95
12	6	Ravenskull *Superior*	9.95
13	12	Big KO *Tynesoft*	9.95
14	10	Commonwealth Games *Tynesoft*	5.95
15	15	Stryker's Run *Superior*	9.95
16	16	Konami's Coin-Op Hits *Imagine*	9.95
17	13	Sphere of Destiny *Audiogenic*	7.95
18	•	Plan B *BugByte*	2.99
19	17	Thunderstruck 2 *Audiogenic*	7.95
20	20	Cholo *Firebird*	14.95

Compiled by Gallup/Microscope

Grand Prix Construction Set and Phantom keep their first and second positions this month. Superior has four games in the Top 10, while BugByte has two re-entries with Dunjunz and Plan B. Look out for the disc version of Dunjunz which is now available, and for Stryker's Run Part 2 – both of which are reviewed this issue.

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Panasonic 1091 - Byte Magazine Says It's No 1	£228
Epson FX800 - Brand New! 240cps! Wow!	£298
Epson EX800 - 300cps & 80 column-Super Fast!	£385
Seikosha MP1300AI - 300cps!	£299
MP 165 - Cheap Fast And Good Quality 180cps	£170
MP 135	£135
Oki Microline 182 - The Number 2 Brand	£188
Oki Microline 192 - Perennial Favourite	£282
Citizen MSP 10 - 160cps draft 80 column	£277
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Epson EX1000 - 300cps & 136 column-Super Fast!	£517
Seikosha MP5300AI - 132col Version of MP1300	£439
MP 200 - 200cps! 132 column!	£260
MP 201 - 132 column 200cps	£295
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Oki Microline 293 - Worth A Long Look	£608

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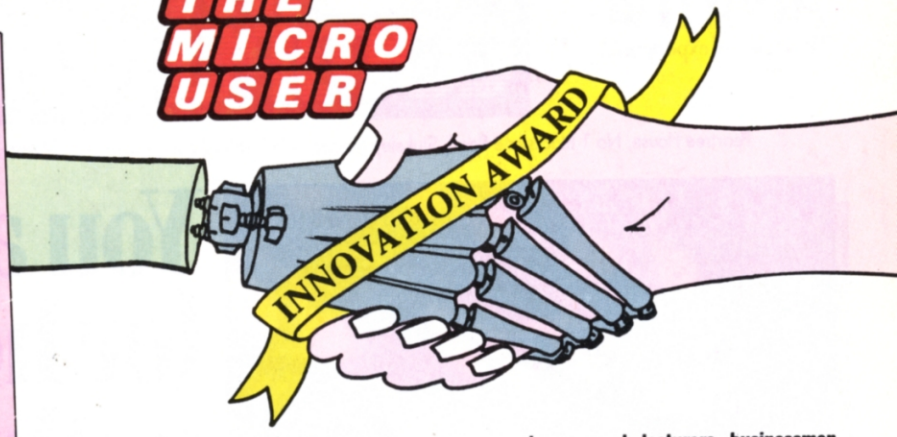

THE announcement that *The Micro User* is searching for the most innovative use of a BBC Micro has created a wave of interest nationwide.

Within seven days of details of the competition being revealed in last month's magazine, more than 100 entries had been received. They came from people as diverse as senior research lecturers, businessmen, helicopter pilots and schoolboys.

But each had one thing in common – the desire to carry off the top prize of a £1,000 BBC Archimedes, the world's fastest micro.

Here is a random selection of the fascinating stories that have already come to light . . .

Lifesaver

A BBC Micro is playing a major role in saving lives at the Western General Hospital in Edinburgh.

It is being used to measure brain blood flow patterns as part of the monitoring of vital signs in seriously ill patients – a task usually requiring a mini computer and the full resources of a medical radioisotope department.

The problem comes however when a patient in a critical condition has to be moved from one end of the hospital to the other for repeat scans.

Enter the BBC Micro, an in-house data logging system and a second-hand gamma camera – combined together to form the brainchild of medical physics technician C.M. Ferrington.

The gamma camera is sited close to the patients. It is linked to a BBC Micro which controls the acquisition of 256 1k images collected from the patient over 80 seconds following the injection of a radioactive tracer.

At the same time, a second radiation detector monitors the activity as the tracer flows through the heart – and a curve is built up in the data logger.

Both the total brain and heart radioactivity levels are plotted on screen by the BBC Micro to ensure that the process is proceeding normally.

Once the scan has been completed, the data is transferred from the data logger memory via the micro onto a floppy disc. This is then transferred to another BBC Micro linked to the mini computer system via the RS423 port.

Music player

WHEN hymns are sung in assembly at a school in Newport, Gwent, they are accompanied by a BBC Micro.

The machine had to be called in after the departure of the music teacher who had previously played the piano each morning.

The first step was to translate some traditional hymn tunes for use on the machine.

Unfortunately the volume was not sufficient for the school hall. To the rescue came a local firm, who provided an amplifier.

Now the sound of children coughing is once more drowned out by All Things Bright and Beautiful – thanks to this innovative use of a BBC Micro.

Money earner

ALAN Brown has turned to his BBC Micro to raise funds for handicapped scouts in Edinburgh.

In fact, he has two projects currently underway – both involving Christmas. The first is selling cards and gifts items from a catalogue.

Over the last three years Alan has written software which enables his team to pick up substantial orders and process them with speed.

And the rewards can be substantial. Profit on sales is 25 per cent and – if more than £4,000 worth is sold – a five per cent bonus is added.

Such is the efficiency of the group thanks to the BBC Micro that it also "launders" orders for other voluntary organisations.

Requesting additional goods in this way means that the full 25 per cent can be passed on – while the handicapped scouts support group retains the extra five per cent.

Alan Brown also runs what is believed to be the biggest postal delivery scheme of its type in the country on his BBC Micro.

In all, his team delivers Christmas cards to over 5,000 different streets, charging the general public 10p per card delivered.

The micro is used to sort all the street names into alphabetical order, allocate areas to the scout and guide teams of collectors, calculate the amounts due and from whom.

Now in its fifth year, the Edinburgh fundraising operation based on a BBC Micro has shown a growth rate of 1,000 per cent.

Flight checker

TRAVEL over the North Sea is now much safer – thanks to a pilot and a BBC Micro.

Captain R. G. Askey of Bristow Helicopters was asked to help with a computer project to monitor the position of machines in flight.

His task was to provide information on the arrival time of each helicopter at its destination.

What was needed was a micro with RS232 input, clear display, rapid processing ability, and reliability for extended unsupervised running.

Captain Askey opted for a BBC Micro and programmed it in a combination of machine code and Basic to accept data along the serial interface whenever an input was made to the main computer – a Sirius.

This data is then organised by status and the ETA adjusted from GMT to BST if required.

Flights currently airborne are then displayed by their status – outbound, on deck at the oil rig, or inbound – together with the estimated time of arrival at their destination as computed in real time by the main computer.

The principle benefit of using the BBC Micro in this way is to allow the department responsible for helicopter safety offshore to concentrate on its primary task rather than having to answer queries.

There is still time to enter for the award. For further details see Page 67.

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▶ PEP024

You ain't seen (or heard) nothing yet!

Dear Reader

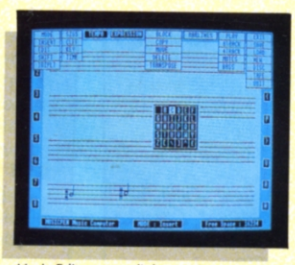
To make sure that there can be no confusion between Peartree Products and products by other manufacturers we have renamed the Peartree MUSIC 7000 the Peartree MUSIC 87 synthesiser.

The Peartree MUSIC 87 is a high quality music add on for the BBC B, B+ or Master 128. It enables the production of eight voice musical compositions, and incorporating an unlimited range of instrumental sounds designed entirely by you, the user.

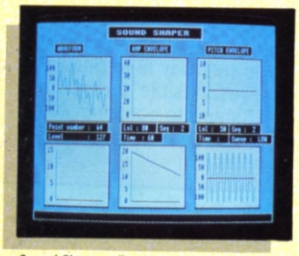
The MUSIC 87 solves all the old problems and adds these new outstanding features:

- **6502 2nd processor compatible**
- **Light pen driven**
- **Mouse driven**
- **High resolution (mode 0) screen graphics in most of the program to show maximum detail and minimum clutter**
- **Menu driven**
- **Facility to print out music score in standard music notation**
- **Creation of sounds using wave forms and sound parameters defined entirely by the user**
- **Music score displayed on screen in time with play back**
- **Functions include DFS and ADFS**
- **Music keyboard available soon**
- **Software available to upgrade your Music 500 or Music 5000 at £39.95 (PEP025)**

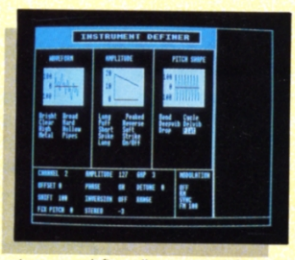
Studio Desk menu with mouse driven record, play, rewind options



Music Editor menu, light pen & mouse driven with complete menu options at top



Sound Shaper allowing you to create your own waveforms, envelopes, mouse, lightpen or keyboard driven



Instrument definer allows you to define your own instrument pitch, amplitude and wave forms

MUSIC 87 SYNTHESISER

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ACH012	**512K MSDOS for MASTER** IBM compatible DOS plus 8186 processor	£189.00
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ACP003	**MEGAMOUSE** High quality UK manufactured Slip free rubber coated ball Fully AMX compatible	£49.00
ACH034	**ACORN MUSIC 500**	£39.00

ECONET

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All Peartree Disc Drives have a two year warranty by Akhter Computers

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ACP034	**BBC B DUST COVER**	£4.50

The Acorn Music 500 SYNTHESISER

Now available from **Peartree** the Acorn Music 500 for the BBC, BBC B+, Master 128

£39.00 excluding VAT.

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MONOCHROME

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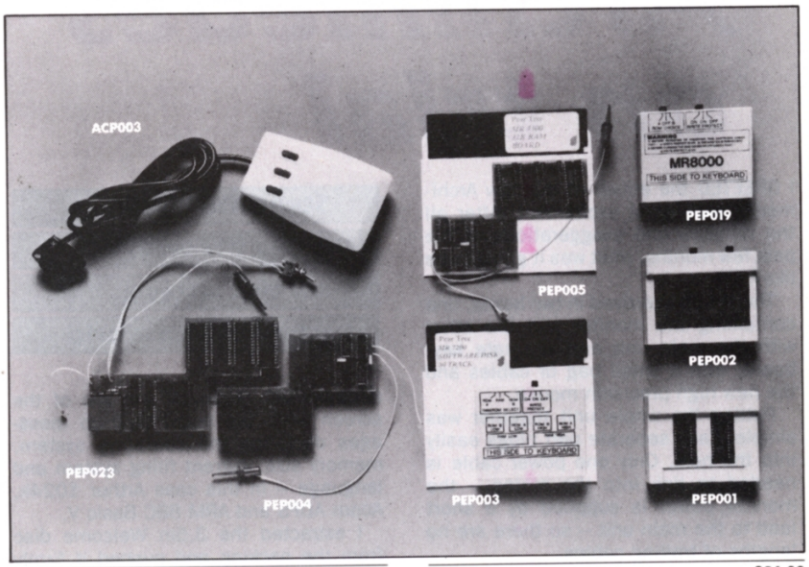

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Archimedes

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The ARCHIMEDES range includes the 300 Series and the more sophisticated 400 Series.

All machines have features in common:

- **32 bit RISC technology;**
- **ergonomically styled in a 3 box presentation;**
- **'IBM enhanced' style keyboard with 3 button mouse;**
- **British Broadcasting Corporation Micro style operating system (ARTHUR);**
- **BB BASIC V;**
- **interfaces; printer, serial, monitor, stereo sound;**
- **ECONET plug-in option;**
- **a variety of podules can be fitted.**

THE 300 SERIES

The 300 Series, identified by its red function keys, consists of two models, ARCHIMEDES 305 with 0.5 Mbyte of RAM and ARCHIMEDES 310 with 1 Mbyte of RAM. These machines are the latest generation of British Broadcasting Corporation Micros. They offer, at low cost, all the basic features with expansion capabilities. Both machines have a 512 Kbyte ROM and a 1 Mbyte (unformatted) 3½" disc drive.

THE 400 SERIES

The more powerful 400 Series offers considerably increased expansion capabilities. These machines are the new range of Acorn Computers.

The ARCHIMEDES 410 has 1 Mbyte of RAM; 1 Mbyte (unformatted) 3½" disc drive; a hardware floating point unit option; a co-processor bus; a hard disc controller; a four socket back plane; 512 Kbytes of ROM.

At the top of the range is ARCHIMEDES 440. This machine possesses all the features of the 410 as standard, with the adoption of 4 Mbytes of RAM and a 20 Mbyte hard disc.

ARCHIMEDES is an open system and its flexibility is achieved by fitting any of the following podules (peripheral modules) via a back plane:

- **hard disc controller (300 Series only);**
- **ROM extension board;**
- **MIDI music interface;**
- **MS-DOS co-processor;**
- **SCSI;**
- **hardware floating point unit;**
- **Ethernet podule.**

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The NEW High Performance 32 Bit Risc Processor from Acorn

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	COLOUR	**£999**
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	MONO	**£925**
	COLOUR	**£1075**

400 SERIES

A410 SYSTEM	**BASIC**	**£1399**
	MONO	**£1449**
	COLOUR	**£1599**
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Archimedes on trial

Steve Turnbull takes the wraps off the fastest micro in the world

I GREETED the arrival of the new Archimedes with great excitement. After all the rumours and exaggerations of the past few months, what was it going to be like?

The machine arrived in two boxes, one containing the monitor and the other with the main unit and separate keyboard, with a small bag of cables and the new high precision mouse.

Putting the whole unit together was simple. Each separate part plugs easily into the next. Only one power cable is needed to link into the mains – the monitor power is supplied by a short lead to the main unit – so there are no lengths of trailing cables.

The main unit is made of metal with moulded plastic front and back, and incorporates a cooling fan, with the monitor sitting comfortably on top.

A thick cable carries the video signals to the monitor and the video connector can be screwed into place on the main unit to avoid being pulled out accidentally.

The lightweight and low-profile keyboard plugs into the main unit at the front right, the mouse plugs into the keyboard at the back below a position clearly marked "mouse" and right beside this is a recessed reset button – which it would be difficult to press accidentally.

The moment of truth came as I switched on the main unit. The fan whirred into life, the computer gave a melodious beep – and I was looking at another BBC Micro. At the top of the screen were the usual start-up messages declaring the operating system, memory size, current filing system and language – in this case Arthur 1024k, Acorn ADFS and ARM BBC Basic V.

I extracted the 3.5in Welcome disc from the packing and pushed it firmly into the built-in drive which accepted it and slammed it into position.

What to do next? Well, the screen looked like a BBC Micro, so why not Shift+Break? I tried it and away the machine went loading up various files and modules.

Finally I was presented with a screen containing a wide bar across the bottom with six icons to the right, a disc icon on the left and a pointer in the middle – and I was into the Welcome disc desktop.

Each of the right hand icons is a particular desktop facility – a palette to change the 16 screen colours into any of the 4096 available, a notepad, a diary, a clock running off the built-in clock chip, a calculator and an exit icon to return to Basic.

As a test I ran the notepad by positioning the pointer over the icon using the mouse and clicking the Select button on the mouse. A window opened up on screen with the notepad space in the middle.

Around the central work area of the window is the one character wide border. This contains a title at the top with two icons at the top left (the "put this window to the back" and "cancel this window" icons), a "size adjust" icon in the bottom right hand corner and "scroll bars" to the right and the bottom.

By clicking various parts of the border you can change the size of the window, alter the part of the work area that is viewed through the window, and move the whole window physically around the screen. I found that by clicking over the centre of the work area I could actually type in notes from the keyboard.

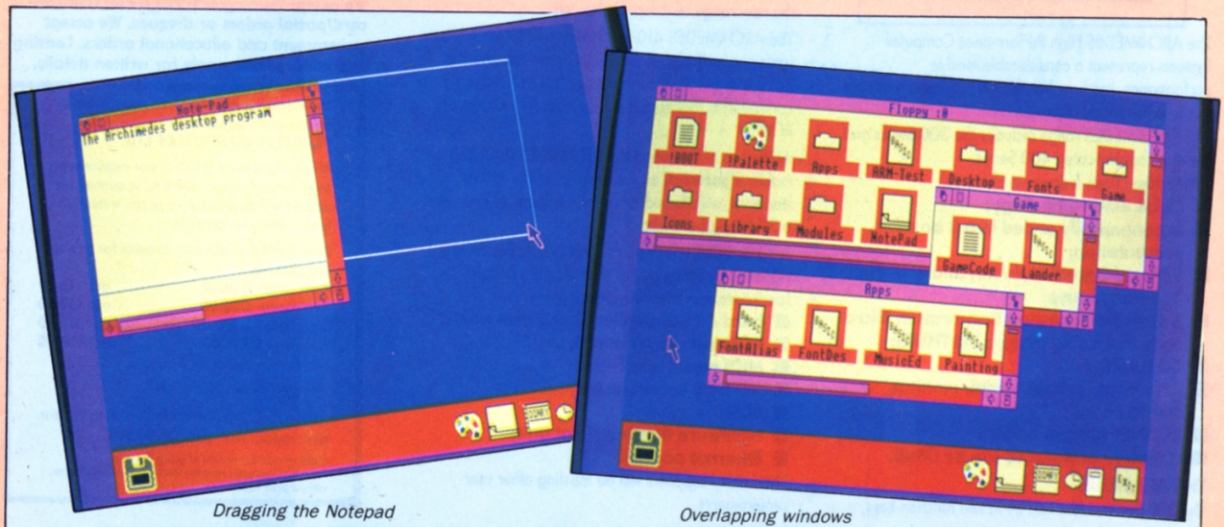
At any time I could bring up one of the other icon options (the diary or the clock) while the notepad remained on the screen. Each new window overlays the others but by moving them around and selecting sizes you can arrange the screen as you want.

Each of the six desktop programs is actually just a subsection of one program which on my machine was written in Basic. This shows that the operating system is just as accessible from Basic as it was on the earlier machines.

Clicking the disc icon opened a window with a selection of further icons, some indicating files and others ADFS sub-directories.

In the Applications directory is the font designer for the anti-aliasing fonts – the program to convert the designed fonts into a form that is useful to the machine – a painting program and a staff notation music editor.

Modules supplied on the Welcome



Dragging the Notepad

Overlapping windows

Lander landscape

disc are the Basic editor, 6502 emulator, a machine code debugger, a floating point emulator for machine code floating point instructions, various printer drivers and a ram version of Basic.

In the Utilities directory is a sprite editor (which, frankly, is not up to the high quality of the other programs) and a directory copy routine for the ADFS.

Finally there are some tutorials, an ADFS for beginners, a keyboard tutor and a demonstration of the graphics modes and capabilities.

But the Welcome disc's best demonstration of the graphics power and speed of the Archimedes must be the Lander, which is only a demo game.

I booted up the program to be presented with a three dimensional landscape using both colour and size perspective, a couple of trees in the background, three missiles sitting on a pad and in the centre an Elite-style spaceship in solid colour.

The basic aim of this ARM machine code game is to shoot up everything on the ground to score points and each point is worth one bullet. That's the easy part – the hard part is trying to fly the ship using the mouse.

The terrain motion was smooth, no matter how fast I flew the ship. Every single object on screen had its own shadow and objects that had been blown up continued to smoke – the program is really quite staggering.

A full blown version of the game will be released later in the year by Superior Software, called Zarch.

Finally there is just one niggle. The noise from the fan can be very noticeable – but with a machine of this speed and quality that is the only complaint.

Already questions about the Archimedes are flooding in. We answer some now and will be answering more over the next few months.

So, if you have any questions about the new super micro from Acorn don't hesitate to send them to: Archimedes Questions, The Micro User, Europa House, 68 Chester Road, Hazel Grove, Stockport, SK7 5NY.

Q. Will I be able to transfer and use my existing 5.25in disc files?

A. *It will be quite difficult to add a 5.25in drive to the Archimedes. Transfer of data from 5.25in DFS to 3.5in ADFS will not be possible directly since there is no intention of supporting the DFS on the Archimedes.*

File transfer via the serial port or across an Econet system would work but conversion on a Master or Compact which has both types of drive fitted is perhaps the simplest way.

Programs will work if they are pure Basic or use 6502 machine code legally (on the 6502 emulator). But if, for example, they try to access system memory locations directly then they will fail. Programs which have relocation routines access memory directly and must have these routines removed.

Q. Can I connect a cassette player to the Archimedes or are all my cassette programs going to be useless?

A. *Cassette programs will work if they are legally written – but the Archimedes does not support a cassette filing system at all and even *TAPE produces an error. The programs would have to be transferred, for example, via the serial port of another BBC Micro.*

interface but it is unlikely as most cassette-based programs are games which, if they access the screen directly, will not work anyway.

Q. What rom software is included in the basic Archimedes and will we be able to use our existing roms?

A. *The operating system – Arthur – and Basic V are on rom in the machine – a total of 512k. These programs are written in ARM machine code but your BBC Micro roms are written in 6502 machine code so will not work directly.*

But all is not lost. Any language or application that behaves correctly and is fully Tube compatible will work on the 6502 emulator.

Q. Will there be a good User Guide supplied with the micro?

A. *If you mean one that will tell you everything there is to know about the machine and all the software tools available – the answer is no. A programmers' technical manual will be available later.*

The User Guide is similar in scope to the original BBC Micro User Guide covering the basics of sound, graphics, Basic and the higher level machine functions.

Q. Does Archimedes support colour composite video? Many people have monitors which have composite video-in or only digital RGB instead of analogue RGB?

A. *There isn't a composite video output and unfortunately a PAL encoder will cost £200 or more.*

◀ From Page 21

Q. Will the Archimedes use Econet to link with existing BBC Micros?

A. Yes, the Econet hardware is fitted as standard and only needs the software to run. It will be a far superior file or print server due to its speed and memory capacity.

Q. The mouse looks rather big in the photo in *The Micro User*. Is it compatible with the new AMX mouse?

A. The Archimedes mouse is manufactured by the same Swiss company as the new AMX mouse – the apparent size in the photograph was simply due to the camera angle.

Q. Will Acorn be providing a UK keyboard with the quote marks as Shift+2?

A. The Archimedes does not have a soft (redefinable) keyboard, but a small machine code program could be written to swap the codes of the Shift+2 with the Shift+comma. Acorn is unlikely to supply a different keyboard.

Q. The disc eject button looks rather close to the on/off switch. Couldn't the wrong one be pressed by accident?

A. The Archimedes on/off switch is at the back of the main unit. The switch you can see is for the monitor only. Even if the monitor is switched off it makes no difference to the Archimedes and no data will be lost.

Q. Will our existing colour monitors need any modification?

A. To accept the analogue RGB output of the Archimedes you will need a monitor that responds linearly to signals from the RGB port. This means that if the monitor gets more voltage on the R signal the screen image at that point gets redder. Some monitors used with BBC Micros are already linear and others have a digital first stage which can be bypassed.

In particular the Microvitec has linear RGB. The link change required was given in part 2 of Video Digitiser Body Building project, in the June 1987 issue of The Micro User. Electrohome (JVC) will accept linear RGB and the Kaga needs an extra DC offset voltage (which is a simple converter) or it can be used as it stands but you won't get the full range of colour.

Q. Can the discs be ejected easily with the keyboard hard up against the main box?

A. Due to the slight angling up of the drive and the very low profile keyboard there is no difficulty at all in ejecting the disc.

Q. Will the Archimedes have a speech generator which emulates the Texas speech system?

A. Any speech system developed for the Archimedes will use the built in sound outputs in the same way as Superior's Speech! for the BBC Micro. The very high quality of the Archimedes sound system will allow excellent digitised speech.

Q. Does the Archimedes have sprite control and the other facilities available through the GXR and Master VDU commands?

A. It has a sprite system which is fully compatible with the GXR/Master commands. The rectangle, circle, ellipse (with and without fill), sector, segment, and so on, commands are all available from the Archimedes operating system.

Plus there are the anti-aliasing fonts giving you easy access to an unlimited supply of on-screen type styles in any size.

Q. Will the existing hardware such as teletext adapters and modems work with it?

A. As it stands the Archimedes does not have any sockets like the 1MHz bus, user port or analogue port. So any add-on which uses these cannot be connected. The RS423 is standard so external modems can be connected.

One of the first podules (peripheral modules) to be produced by Acorn will be one carrying a 1MHz bus, user port and analogue sockets.

Q. Is the headphone socket on the Archimedes really 32 ohms resistance and why is at the back of the main unit?

A. Yes, it is 32 ohms, but it will work with conventional 8 ohm headphones without any detriment to the sound quality. The socket is on the rear of the unit so that Acorn's recommendation to connect Archimedes to a hi-fi can be easily accomplished.

Q. Are two speakers fitted to the Archimedes or is it necessary to use headphones for stereo sound?

A. Only one speaker is fitted and it is about the same quality as that in the BBC Micro – this is to encourage you to either use headphones or connect the system to a hi-fi.

The monitor supplied by Acorn contains a speaker which is slightly better than the one in the Archimedes so if you make a lead with a stereo jack plug on one end and a phono plug on the other you can connect the Archimedes to the monitor audio-in socket and use this speaker as well.

Q. What is the 6502 emulation mode on the Archimedes?

A. In order to maintain upward compatibility the Welcome disc contains a program which emulates a 6502 second processor or co-processor. This in effect has the Archimedes ARM pretending to be a 6502 running, perhaps, the Basic language running a Basic program.

Most programs that run correctly on a 6502 second processor will also run correctly on the 6502 emulation. In this mode you can also have 6502 machine code. View 2.2 works correctly in this mode, even using 132 columns, when the BBC Micro only has a maximum of 80 columns.

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DFDC with ADFS 2.1 ROM set ..... **£55.00 inc.**
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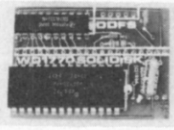
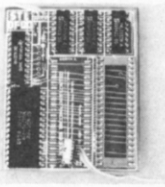
Data sheet available on request.


WD-1770 DFS


WD-1770 + 8271

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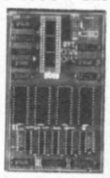
TWO MEG 128

SOLIDISK FOURMEG 32K UP TO 256K:

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Sideways RAM can be used to load ROM images into the BEEB, make a printer buffer, store data and programs etc. Sideways RAM are additional memory to the basic 32K of the BEEB. To date, more than 50,000 BEEBs have been fitted with Solidisk Sideways RAM.
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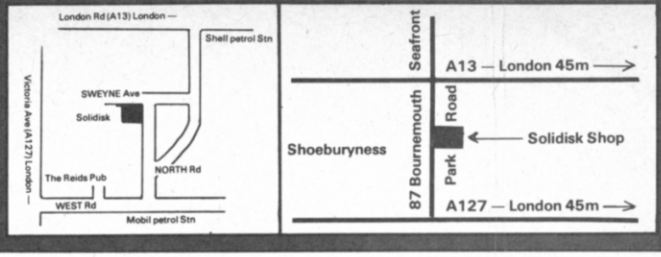

MASTER:

Our typical MASTER systems comprise the MASTER with 128K RAM, wordprocessor, spreadsheet, ADFS 2.1 cartridge and choice of drives and monitors.
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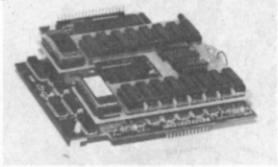
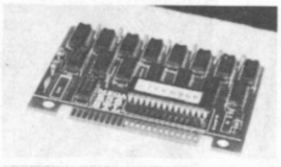
Price: **£239 inclusive.** Your BEEB must have a WD-1770 and ADFS.
Data sheet available on request.



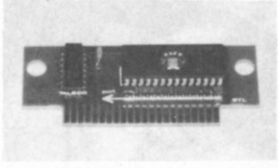
THE PC-PLUS:

The PC-PLUS is an expanded PC-500, with one Megabyte of RAM instead of 512K. The extra memory allows large applications such as Desk Top Publishing (eg Fleet Street Editor) to be used on the BEEB or the MASTER.
The PC-PLUS is supplied with the same accessories as the PC-500 including the mouse and 4 discs. Price **£339 inc.**
Upgrade from an existing Acorn 80186 costs **£119.00** but you will be required to sign a service agreement. Please ring for details.
Data sheet available on request.



TURBO-BEEB:

The TURBO-BEEB plugs directly into the TUBE connector of your BEEB and consists of the Acorn TURBO 64K, 4MHz 65C02 internal co-processor for the MASTER adapted by Solidisk with an appropriate lead for use on the BEEB (and the Master), like the PC-500. Price **£135.00 inc.**
Data sheet available on request.



MASTER MEGA CARD:

The MEGA CARD (256K) plugs into a cartridge slot on the MASTER and adds instantly 256K of RAM. The card can be used as RAMDISK, printer buffer or sideways RAM. Price **£100.00 inc.**
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Into the depths

Steve Gold looks at Multi User Games and shows how to go adventuring via the telephone

LAST month we looked at single player adventures for BBC Micro and modem users. Having explained the basics of online adventuring we'll now go into the depths of the Multi-User Dungeons.

Adventure games have come a long way since the first programs were written for a DEC-10 mainframe back in the 1970s. Today it's possible to play respectable adventures on even the smallest computer.

So why multi-user? Contrary to what you might think, MUGs do not go for the team approach to adventure game-playing, although this is perfectly possible. Instead, the online adventurer via his BBC Micro software interactively pits his or her wits against fellow players, as well as the program.

As we saw last month, online adventures can be many hundreds of times larger than those which run on a standard BBC Micro. Size, however, is not everything, as the unpredictability of an online adventure soon palls, and the program defaults begin to assert themselves. After a while you get to know where objects are going to be after the reset button has been pressed.

MUGs first appeared in the late 1970s – the first being the Multi User Dungeon (MUD) which appeared on Essex University's DEC-10 mainframe computer. Several other copies of MUD have since appeared on online systems the world over.

MUD was written by Roy Trubshaw in 1979. An undergraduate at Essex University at the time, he wrote the game to give himself and his friends some amusement. After tiring of having to trek to the university to use a computer terminal each time he wanted to play the game out of office hours, Roy linked the system into the university's modem lines, allowing them to play MUD from home.

Thanks to multiple modem links, several other people unconnected with the university, some as far away as America and Japan, started playing.

In 1980, another undergraduate, Richard Bartle, joined the university and helped Roy tidy up the game. Its popularity became so great that it ate into the DEC-10's overall capacity, so MUD was banished to the small hours. It was only playable between midnight and 6am, when the mainframe was used for little else.

In 1984 Roy and Richard were joined by an entrepenuer, Simon Dally, and they formed MUSE (Multi User Entertainment), and set about creating a commercial version of MUD, which now runs on a DEC-10 located in London.

MUD-II is available on a pay-as-you-play basis 24 hours a day. Subscriptions involve the purchase of a starter-kit, which includes a logon ID, your initial password and a manual.

Context-sensitive help is available online, but it costs a lot less to curl up in your favourite armchair and read the manual before you logon for the first time. As the old computer proverb says: "If all else fails, read the manual."

As with Telecom Gold, MUD is available on direct dial to London at a variety of modem speeds, as well as via Packet Switch Stream, the British Telecom data network. PSS costs just a few pence a minute to use, compared to relatively high costs of dialling direct to London.

The scenario of MUD is similar to that of all adventures – a magical, mysterious land inhabited by elves, dwarves and goblins. There is an underground kingdom, a sea, a ship and an island. Players can get lost in forests and graveyards, go down the mine, fall off a cliff, and generally have a good time – even drinking is allowed in the game (for over-18s only, we are told).

As with all adventures, the aim is to score points and reach the level of Wizard. To score points you must experiment in the game and collect treasure. Most players tend to use fantasy names – it adds to the fun. Online names like Gandalf and Endora are common.

New players always start with a score of zero, which qualifies as a Novice. As points accrue, you pass through nine further levels of persona: Warrior, Champion, Hero, Superhero, Enchanter, Sorcerer, Necromancer, Legend and Wizard.

If your alter-ego gets killed by another player your score is reset to zero and that player enhances his score. If, on the

other hand, you get killed by a game mobile, then you keep your score to play again.

As you progress through the levels, your strength increases and you are able to cast spells on other players. Using spells, you can call other players, silence, deafen and even cripple them or, if you're feeling friendly, cure them.

Playing online adventures like MUD is fun. Unlike other micro-based adventures which, when completed, soon pall MUD has an unlimited endgame. The level of Wizard is MUD's substitute for the endgame and goes on indefinitely.

Wizards enjoy an exalted status in online adventuring circles and can interact at will with other players. It's a fair bet that you will directly encounter Wizards – both friendly and unfriendly – in your travels online in MUD.

As with real life, you can talk with other players. Many join MUD simply to converse with other players, rather than play the game itself.

MUD isn't the only online MUG – by a long chalk. One of the most recent newcomers is called Lap of the Gods, run from London.

Although most MUGs are based around the run-of-the-mill pseudo-medieval fantasy role-playing scenario, Gods is different although at first glance the system environment seems similar to other multi-user environments.

On closer inspection however, there are subtle differences: The aim is different. Most MUGs are based on death and mayhem while Gods actively encourages players to work with each other. Indeed, to score points and progress you need to help and be helped by other players.

Fighting in Gods is not encouraged – it is a pleasant environment, as the manual calls it, "an electronic Disneyland where you are not just a spectator, you are a major player."

But enough of the descriptions. In the panel (right) is a sample online session from Gods. If you enjoy playing adventures, you'll love playing Gods, and you can do it from the comfort of your own home through the kind offices of your BBC Micro.

Further information from:
Multi-User Entertainment, 6 Albermarle Way, London EC1V 4JB.
Tel: 01-608 1171 (voice) 01-608 1173 (data)
Lap of the Gods, 166 Portobello Road, London W11 2EB.
Tel: 01-256 8427
Lap of the Gods is available on 01-9949119 at 300 baud and 1200/75 baud. Once into the system, you can select the game menu (Option 1) and logon with an ID and password of GUEST. The guest option allows you up to 15 minutes of game time free of charge.

```
                    The Gods Box

    1) Play Gods
    2) Use the Bulletin Board
    L)ist of known personas (about 100 seconds at 1200 baud)
    H)ow to register on Gods
    G)oodbye (Toodleoo)

[Gods Box]> 1

Please enter your account number (or GUEST): DEM012
Password (or GUEST):
It is Thu Jun 30 23:26:07 1987
You have played 32 times before
Your last game was from Thu Jun 30 20:44:09 1986
You have 18 hours and 51 minutes of credit left.
Requesting Gods
```

```
                    W e l c o m e   T o   G o d s
                    =============================
(c) 1986  Lap of the Gods Ltd.
Please enter a first name (EXACTLY as you wish it to appear):
@ ALTARES
What is the password?
@
Welcome to Gods.
You are floating on air.
Below you can see a Mediterranean port. You start to fall
towards it. At first, you hope that you are going to hit the
sea, but it soon becomes apparent that you are going to land
right on top of a rather pretty building. The last thing you
notice is a courtyard with a coach standing in it, next to
the building whose roof you are about to demolish, and then
your scream (which started some time ago) suddenly cuts off
as you pass out.
Your Hotel Room
You struggle back to consciousness, and find yourself in
your hotel room. A doorway leads out to the West.
@ W
Inn Yard
You are in the yard of a coaching inn. Straw and dung on the
ground show that horses come here often. The scene is busy
with travellers and ostlers. Doors lead inside to the tap
room and bedrooms. There is a balcony at one end of the yard
at first floor level, though you can see no stairs leading
up to it. There is a fairly magnificent coach here. The
horses champ at the bit, eager to get a move on. A match is
on the balcony.
@ WHO
Altares the Starfighter
Honk honk
Guest
@ You hear a faint screaming which gets louder and louder, then stops
abruptly.
@ Chameleon the Difficult to See shouts, 'hiya'
@ Chameleon the Difficult to See has just arrived.
@ SAY "HI CHAMMY
@ Chameleon the Difficult to See cuddles you.
@ BLUSH
@ You turn a deep red.
@ Honk honk shouts, 'Hiya Chammy'
@ Chameleon the Difficult to See shouts, 'hiya Honk, any tea left
perchance?'
@ Honk honk shouts, 'all of it I think!
@ Honk honk shouts, 'just came on, and the place is swarming with
bunnies'
@ Chameleon the Difficult to See shouts, 'hehehe'
@ A bunny arrives bouncily.
@ You hear a faint screaming which gets louder and louder, then stops
abruptly.
@ Lucy has just arrived.
@ Lucy shouts, 'hello'
@ A bunny bounces out gracefully.
```

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SOCCER MANAGER

GAME

B | B+ | M | Acorn

Patrick Berry gives you the chance to win the League and FA Cups

IT is the beginning of the 1987/1988 football season and you have just been appointed manager of a soccer team which has just completed its fall from grace.

You, as team manager, are expected to restore the team's winning ways and you can be sure that the chairman, already upset by the situation, will not hesitate to fire you if you fail.

You begin Soccer Manager with a 15-man squad and £400,000 in the bank, from which you must build a team that will dominate English football. This will happen if you use your existing squad and the transfer market to its best advantage.

There are 10 levels of skill with the top levels capable of challenging even the best managers.

Each player is given a skill level and a form rating and from these his price is worked out. The skill rating is from one to five and changes by one point at the end of season.

The form rating changes week by week and is given a totally random value at the end of the season. Throughout the season the computer keeps track of your own rating and the overall team morale which can affect your team's performance.

As well as the League Cup there is also the FA Cup to win and bring you more managerial glory. So ever onwards and upwards should be your target, to the top of Division One.

```
   10 REM Soccer Manager
   20 REM by Patrick Berry
   30 REM (c) Micro User
   40 MODE 7:VDU23,1;0;0;0;:*FX220
   50 ON ERROR MODE7:REPORT:PRINT" at li
ne ";ERL:END
   70 PROCda:PROCintro
  100 REPEAT tm$(1)=tea$:PROCns
  130 FOR lp%=1 TO 2:FOR wk%=2 TO 16
  140 PROCwk:PROCmu
  150 IF wk%=4 OR wk%=10 OR wk%=15 OR wk
%*lp%=16 PROCfa:tm$=tm$(wk%+((Di%-1)*15)
)
  160 PROCop
  170 PROCsl:PROCsc
  180 X%=0:PROCdi:IF X%=1 GOTO170
  190 PROChf:PROCwo:PROCrt:PROCtb:PROCew
  200 NEXT:NEXT:PROCes:UNTIL FALSE
  230 DEFPROCintro:CLS
  250 PRINT CHR$141CHR$129SPC9"Soccer  M
anager"
  260 PRINT CHR$141CHR$129SPC9"Soccer  M
anager"
  270 VDU 28,0,24,39,3
  290 REPEAT:INPUT""What is your name",
mn$:UNTIL LEN(mn$)>0 AND LEN(mn$)<16
  300 REPEAT:INPUT""Enter your team's n
ame",tea$:UNTIL LEN(tea$)>0 AND LEN(tea$
)<14
  310 FOR X%=1 TO 60
  320 IF tea$=tm$(X%) tm$(X%)="Brighton"
  330 NEXT:ENDPROC
  350 DEFPROCsa
  360 REPEAT:INPUT"Name of file",file$:U
NTIL LEN file$>0 AND LEN file$<8
  370 X=OPENOUT(file$)
  380 PRINT#X,tea$,wk%,Di%,lp%,rn%,co
  390 FOR X%=1 TO 16
  400 PRINT#X,P(X%),A(X%),F(X%),P1(X%),X
(X%)
  410 NEXT
  420 PRINT#X,ln%,wl%
  430 FOR X%=1 TO 61
  440 PRINT#X,tm$(X%)
  450 NEXT
  460 FOR X%=1 TO 50
  470 PRINT#X,pl$(X%),ps(X%),pp(X%),M(X%
),S(X%)
  480 NEXT
  490 PRINT#X,ml%,rt%,ca%,sk%,mn$
  500 CLOSE# X
  510 ENDPROC
  520 DEFPROCld
  530 REPEAT:INPUT"Name of file",file$:U
NTIL LEN(file$)>0 AND LEN(file$)<8
  540 X=OPENIN(file$)
  550 INPUT#X,tea$,wk%,Di%,lp%,rn%,co
  560 FOR X%=1 TO 16
  570 INPUT#X,P(X%),A(X%),F(X%),P1(X%),X
(X%)
  580 NEXT
```

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Computers

ARCHIMEDES
HIGH PERFORMANE COMPUTER SYSTEMS

Archimedes systems use the Arthur operating system, a new version of the BBC Micro operationg system. BBC BASIC is replaced by a new extended version, BBC BASIC V. The speed and power of Archimedes allows the programmer to exploit RISC architecture with a range of high level languages for scientific engineering and business uses. In addition to BBC BASIC V, Acornsoft's development languages include C, ISO-Pascal, FORTRAN, Lisp and Prolog. The Acornsoft Software Developers Toolbox provides utilities to simplify program development and debugging; while an extensive Software Developer's Debug Tool facilitates high level leanguage deelopment in C, Pascal or FORTRAN. All Archimedes Systems have a floating point emulator as standard. On the 400 series, complex mathmetical calculations can be further enhanced by the addition of a floating point unit (FPU). All machines have feature: 32 bit RISC technology – BM enhanced style keyboard with 3 button mouse – BBC Micro style operating system (Arthur) – BBC BASIC V – interfaces; printer, serial, monitor, stereo sound – ECONET plug-in option – a variety of podules can be fitted. Archimedes is an open system and its flexibility is achieved by fitting any of the following podules (peripheral modules) via a back plane: hard disk controller (300 series only) – ROM extension board – MIDI music interface – MS-DOS co-processor – SCSI – hardware floating point unit – Ethernet podule.

THE 300 SERIES Consists of two models, Archimedes 305 0.5 Mbyte of RAM and Archimedes 310 with 1 Mbyte of RAM. Both machines have a 512 Kbyte ROM and a 1 Mbyte (unformatted) 3½" disc drive.

THE 400 SERIES Offers increased expansion capabilities. The Archimedes 410 has 1 Mbyte of RAM. 1 Mbyte (unformatted) 3½" disc drive, a hardware floating point unit option, a co-processor bus, a hard disk controller, a four socket back plane, 512 Kbytes of ROM. At the top of the range is Archimedes 440. This machine possesses all the features of the 410 as standard, with the adoption of 4 Mbytes of RAM and a 20 Mbyte hard disk.

305 BASE AKB10	**918.85**
305 & mono monitor	**976.35**
305 & colour monitor	**1148.85**
310 BASE AKB15	**1006.25**
310 & mono monitor	**1063.75**
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A series reference manual	**£19.95**

MASTER 128

Complete With Internal Software **£399.00**
Master Turbo Upgrade **£113.95**
Master Econet Module **£46.00**
Master ET **£349.00**
Master 512 Upgrade **£217.35**

The Master 512 upgrade board incorporates the Intel 80186 processor, plus 512K bytes of RAM. Digital Research DOS+, which is copatible with both MS/DOS version 2, and CP/M 86, allows you to run a large proportion of the most useful programs available. A dual 80 track disc drive is required to run programs on the 512. Provided free with 512 upgrade board are three GEM packages, GEM Desk Top, GEM Write, GEM Paint.

UNIVERSAL SECOND PROCESSOR

This allows you to connect co-processor boards designed for the Master Series to your BBC Models B or B+. Fitting a Turbo board boosts the BBC's already rapid performance to twice the speed of the standard processor. Fitting the 512 co-processor converts the BBC micro into a 16 bit machine, opening up new possibilities within the world of MS-DOS and CP/M 86. **£86.25**

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Reference Manual Part I	**£14.95**
Reference Manual Part 2	**£14.95**
Acorn Teletext Receiver	**£108.00**

FILESTORE

Filestore provides shared access to file and printer services on Econet. The filestore consists of two units – a dual 3.5 inch floppy disc unit 1.2 Mbytes of storage (Filestore EO1) which can be expanded with a high performance 20 Mbyte Winchester disk drive unit(Filestore E20).

FILESTORE EO1	**£952.00**
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Level I Fileserver 40 Track	**£99.00**
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WORD PROCESSING SPECIAL PACKAGE

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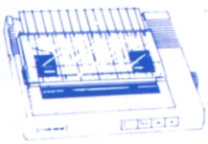

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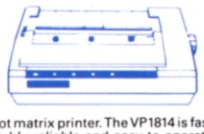

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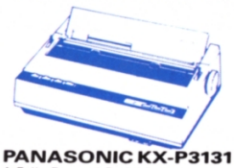

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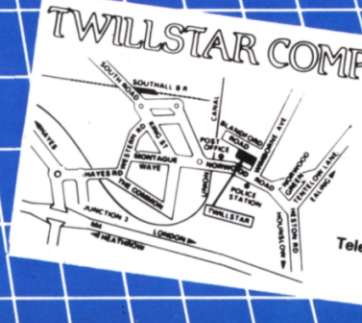

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S: Sound
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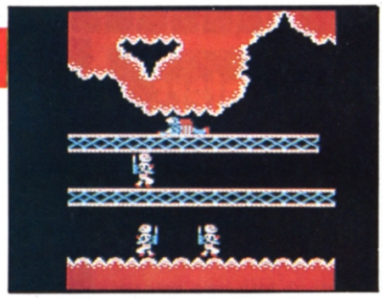
O: Overall

Codename Droid – Stryker's Run Part 2

S	G	P	V	O
5	9	8	7	8



SUPERIOR seems to have perfected the art of producing good Arcade Adventure games. I'm struggling to discover the secrets of its Citadel and I'm no nearer getting to the second level of Ravenskull.

When I was told that Superior had released the sequel to Stryker's Run called Codename Droid – Stryker's Run 2, I just had to try it.

The idea of the game is simple: As Commander Stryker you have to invade the stronghold of the Volgans, negotiate the obstacles, leap off walls and climb ropes, kill the nasties in your way and pick up any useful bits and pieces.

The graphics are completely different and vastly superior (no pun intended) to Stryker's Run 1. Commander Stryker is now Repton-sized and the screen scrolling does not judder at all. Sound is limited to a tune at the start, then gunfire and explosions.

There are some nice touches, travelling up or down in lifts requires special passes which you find along the way. No pass means no further progress.

Other useful items are the power cells which can be used to recharge Stryker's suit or blaster. I also liked the fact that you can kneel and crawl into those cramped little places the bad guys cannot reach.

Apart from your gun, you have five mines per level (renewed whenever you use a lift) which you can drop for the Volgan guards to tread on. Every now and again you'll find a jet pack (more of a jet seat) which has it's own blasters to fly you into places Stryker could not possibly reach on his own.

Be warned – although it's more fun just to play, reading the instructions is a good idea. I found out after a couple of weeks of play that a particular item I'd been picking up without a thought could be very useful.

All in all, Codename Droid seems to be just another Arcade/Adventure and despite its superb programming and obvious high quality it just doesn't seem to have that certain something to make it stand out from the crowd.

Desmond

Price: £9.95 (cass) £11.95 (5¼in disc) £14.95 (3½in disc). Supplier: Superior Software, Regent House, Skinner Lane, Leeds LS7 1AX. Tel: 0532 459453

Bird Strike

S	G	P	V	O
8	8	8	9	8

A RECENTLY rereleased title from the Firebird Silver budget range is a shoot-em-up – Bird Strike. The game starts in the first World War with biplanes and carrier pigeons, and the idea is simple. Move a gun emplacement from side to side along the bottom of the screen. If anything moves, shoot it.

Bird Strike is available only on cassette, but for once I did not mind the wait. While the game is loading, you are treated to a superb three-channel rendering of the World War I music-hall favourite "It's a long way to Tipperary" – very appropriate, considering the setting.

The six biplanes lurk out of reach above the cloud cover. One by one they swoop, showering you with bombs. You can loose off two shots at once – it's certainly needed.

A direct hit on the centre of the plane causes it to vanish in a cloud of smoke, reappearing as a small cross in the graveyard of the church. Destroy all six to move on to the next screen.

If your marksmanship is less than perfect, your quarry will disappear off the bottom of the screen and dive again. Needless to say, any contact is fatal; even a wingtip will flatten you, leaving only a skull as your memorial.

If you hit a plane but only clip a wing, a delightfully animated carrier pigeon is released, cheeping merrily, wings a-flapping. Shooting the birdie adds a note to the music staff at the top of the screen. After 12 pigeons have been brought down, the screen ends, you are awarded a substantial bonus and the tune (the first 12 notes of "Glory, Glory Hallelujah") is played.

Your attackers are now World War II fighters and again you are the unhealthy attraction but can deal with them in the same way. After two more screens, first jet fighters and then helicopters, you are once again back in 1914 with no apparent increase in difficulty.

Bird Strike is initially unimpressive but it grows on you.

Hac-Man

Price: £1.99 cassette only. Supplier: Firebird Software, 64/76 New Oxford Street, London, WC1A 1PS. Tel: 01-631 5206

Zap-Pak

S	G	P	V	O
4	5	7	5	5

ZAP-PAK is a novel idea – two games on one disc at a budget price.

As usual I pressed Shift+Break to boot the disc, only to be greeted with a nasty crunching sound: the disc is 40-track only. I find this most surprising – making a 40/80 disc is so easy, as Chris Nixon's article in the April 1987 issue of *The Micro User* demonstrated. After all, not every 80-track drive has a switch for 40-track emulation.

At the flick of said switch I was presented with a simple but effective loading screen featuring the Players logo and small diagrams of the two games.

The first game, Killapede, is a Centipede variant: Shoot the multi-segmented Killapede and the mushrooms through which it scurries, while avoiding bouncing spiders and mushroom-laying bugs.

The game makes good use of colour, and has a useful option of redefining the keys, but that's about it. Other than a catchy title tune, sound effects are virtually non-existent. The graphics of all the major players – spider, bugs and your own character – leave a lot to be desired.

Not only is Killapede a poor example of Centipede on the BBC Micro, it's also a poor example of programming advancements in four years.

The other game, Cavey, sets you in prehistoric times, as a caveman of that name. The idea is to grab the spears lying around and throw them at the pterodactyls hovering above.

You certainly have your work cut out, for your flapping foes are dead shots with lumps of rock. The task is doubly difficult because you must avoid the rain of rocks and also your own falling spears. Isaac Newton has a lot to answer for!

The graphics are cute, and the sound effects add that little bit extra. The only niggle is that the game's redefined characters are stored incorrectly for the Master to display them as intended.

As far as this compilation goes, Cavey should be recompiled in some other location – Killapede should simply be disassembled.

Hac-Man

Price: £6.99 (disc only) Supplier: Players Software, Calleva Park, Aldermaston, Berks RG7 4QW. Tel: 07356 77421.

Apocalypse

S	G	P	V	O
6	7	6	7	7

WITHOUT mentioning names, but there seems to be an awful lot of megalomania about these days. If you're that way inclined yourself, then this computerised war game should prove satisfying.

You take control of a military campaign, and pit your wits against one to 15 other players. As you might expect strategy, shrewdness and downright double-dealing are all-important!

Altogether there is a choice of 10 maps. Most of them are fairly familiar – Europe, the USA, Great Britain, London – while others, such as Galactic and Near Earth, provide futuristic settings.

On the whole, they are clear, detailed and colourful. Land masses are green and sea areas blue, with a combination of shades and colours to indicate different types of terrain.

At the start, players choose the year in which they want to play, anything from 1000 AD to 9000 AD.

So, if you want to go back to 1066, call yourself King Harold and risk getting nuked in the old eyeball, that's your privilege.

Both conventional and nuclear weapons are available though you can opt just for the former if you abhor nuclear weapons, or nukes as the program calls them.

Price: £9.95 cass, £14.95 disc (mail order only) Supplier: Command Software, Mitre House, Abbey Road, Enfield, Middiesex EN1 2RQ.

The next step is for each player to choose a symbol. Having done that, he must pick a power centre (or city) on the map which will then display his particular symbol. Unfortunately, some of these symbols do not stand out clearly which can be very confusing.

Following these preliminaries, the play proper begins. Each turn has four phases in which a number of options may be actioned by careful use of menus and sub-menus. Deployment of forces is clearly the first priority, though you cannot exceed the revenue you have been allocated.

Conventional forces consist of land divisions and ships and, if you have chosen that option, nukes, too. Clearly, it is important to have an effective combination of forces wisely distributed among your power centres.

By using the scrolling window bottom left of screen, you can examine the map in detail. A variety of letters, numbers and symbols gives data about the position, capability and strength of opposing forces as well as your own.

Moving your forces is one of the most interesting features of the game. By using this facility you can occupy or leave your current position and, more importantly, engage the enemy. Ships and divisions can be moved in convoy or separately. Nukes, however, cannot be moved except, by their own rocket power.

Launching nukes is one of the most enjoyable and often the most disastrous aspects of the gameplay. Once you have convinced the computer that you want to launch a missile – and you are asked twice – the countdown begins.

As soon as the missile is launched it appears on the map. Using the cursor keys, you must guide it towards the target. Fortunately, the nuke can be aborted at any moment before impact

Should you follow your decision through, however, the strike has a devastating effect on the target area, indicated on the map by a black square – no radioactive wind in this comfortable scenario.

If you like wargames or would like to have a bash at one and have plenty of time at your disposal this game should prove enjoyable. But unless you have distinct schizophrenic tendencies and are prepared to take on more than one role, this is not a game to be played solo.

Tony Flanagan

Micro Power Magic 2

S	G	P	V	O
2	7	8	9	6

TAKE ten games from the BBC's dim and distant past, bundle them together on a single disc and sell them for £7.95 – hey presto, you've got Micro Power Magic volume 2.

Mr.Ee is a wizard with a taste for cherries. Preferring a subterranean variety he tunnels underground for the harvest. His cherry picking is hindered by the evil Umphs who pursue him relentlessly.

Umphs can be killed by dropping apples on them from a great height, or with an accurately thrown crystal ball. Mr.Ee is a colourful and fun version of the arcade game Mr.Do.

Fort Cybertron is a castle that is built on 16 levels, each containing 16 rooms laid out in a 4x4 grid. Your task is to proceed through each level, locating an increasing number of objects as you go.

The fort is patrolled by a wide variety of droids, some are harmless unless touched, others will blow you to pieces as soon as you step into view.

The graphics are a little dated, but the game has lost none of its addictive qualities.

Bandits at 3 o'clock is a World War One dogfight game for one or two players. The level of difficulty can be increased by adding airships, enemy flak and clouds. This game has not stood the test of time as well as the first two, the graphics are unexciting and the action slow.

Helldriver is the next program on the disc. You are presented with a view of a small section of a much larger maze. The aim of the game is to drive round the maze as quickly as possible, locating and collecting flags as you go.

Price: £7.95 (disc). Supplier: Micro Power, Northwood House, North Street, Leeds LS7 2AA. Tel: 0532 458800

On the higher levels you are chased by fire engines and police cars. The latter can be impeded using a smoke screen.

The control keys are user-definable, and if you're lucky they may even steer the car. I took an instant dislike to Helldriver when it was originally released and my opinion hasn't mellowed with time.

Things begin to look up as you load the fourth game, Micro Power's excellent Chess program. For less than 80p you get a program brimming with features. It will analyse chess problems, play a Blitz game (you are both allowed a very short time to make a move), save/load to/from disc and even play a game of chess.

My only quibble is that moves have to be entered using algebraic notation, I would have preferred to use the cursor keys.

Felix in the Factory is a variation on the original Acornsoft game Monsters. The factory is laid out as a ladders and levels style structure. Felix has to collect cans of oil to supply the generator. The building is riddled with a variety of monsters and a huge yellow rat. Strategically place the rat poison, stab the monsters, but remember to keep an eye on the generator fuel level, if the lights go out you're in big trouble.

Qix fans will be pleased to see the inclusion of Frenzy, a game of sub-atomic particles and high speed fingers. Using a combination of cunning and timing you move a robot craft round the screen, as it moves it leaves a trail. Every time you cordon off a portion of screen it is filled with colour and you are awarded points.

Somewhere on the screen is a lepton, a little chap spends his time ricocheting around the screen. Ultimately you must trap the lepton in one of your enclosures, to destroy it. Frenzy is a very competent Qix lookalike.

Years ago, I awarded Positron the coveted title of worst game of the year. Well here it is again folks, flex your trigger fingers and prepare to play the fastest, but most tedious, zapper of all time.

Wave after wave of crudely shaped alien spacecraft attack and your best defence is to thrash the return key while whizzing left and right. Boring

Relief from all this excitement is provided by two educational programs, the first is a quiz entitled World Geography.

Answer questions on capital cities and populations and there are seven levels of difficulty to choose from. The country in question is highlighted on a detailed map of the world.

Junior Maths Pack the final program, contains three short, relatively simple, games which involve multiplication and division, the use of coordinates to locate buried treasure, and a fruit machine number game.

Micro Power magic contains a selection of games whose quality ranges from above average to garbage, but at 10 games for £7.95 what have you got to lose?

Steve Brook

S: Sound
G: Graphics
P: Playability
V: Value for money
O: Overall

Crazee Rider

S	G	P	V	O
8	8	10	9	9

DON your crash helmet, zip up your leathers and prepare for battle. You'll need nimble fingers, fast reactions and a Kamikasi streak if you hope to survive.

Superior Software's latest product is not a shoot-'em-up (or yet another Repton clone), but a superb motorcycle race game called Crazee Rider, written by Galaforce author, Kevin Edwards.

There's nothing like screaming down the road on a 900cc superbike with the smell of burning rubber and the sight of cars disappearing far behind.

Okay, so you can't actually smell the rubber (perhaps Superior can include a scratch and sniff card with their next release) and there aren't any cars, just bikes. The excitement is certainly there, and it'll soon have your heart thumping and the adrenalin flowing.

The main screen display shows your bike, (the viewpoint is slightly above and behind the bike so you can actually see yourself), speedometer, race position indicator and your view of the track ahead. At the top of the screen is your score and a bird's eye view of the current race track – there are seven in all.

As the starting lights change to green 60 bikes fly past left and right as you accelerate up the straight towards the first bend. It's a depressing sight (and not one I'm familiar with), but you soon get used to it.

Here the micro cheats as the computer-controlled bikes accelerate to maximum speed instantly, whereas it takes you at least half a mile. It has to, otherwise it wouldn't stand a chance. By weaving down the straight from the starting grid you can block a few and stop them passing.

Price: £9.95(cassette), £11.95 (5.25in disc), £14.95 (3.5in disc). Supplier: Superior Software, Regent House, Skinner Lane, Leeds LS7 1AX. Tel: 0532 459453.

Luckily, your racer has been tuned by the best mechanics in the business and they have squeezed a few extra horses out of the engine. This means that flat out on the straight, cuddling the petrol tank with your chin on the handlebars, you can easily overtake the fastest of the micro's bikes and work your way up the field.

The back markers are fairly slow and can be a bit of a problem as they have an annoying habit of getting in the way at the worst possible moment, usually right in the middle of a bend. Touch the throttle and the back-end will slide away, but you can scrub off a bit of speed and ride round them by dabbing gingerly at the brake.

The bends aren't particularly easy, but you can see what's coming by looking at the plan view of the track at the top of the screen. Your position is shown as a large red dot, although the other riders aren't shown.

After discovering that you can't crash or go off the track, my first instinct was to hold the throttle wide open, shut my eyes and hope for the best.

I soon discovered this wasn't the best tactic, and your speed drops rapidly as you near the edge of the track or ram your bike up the exhaust of the one in front.

It's best to follow the racing line through the bends. With one eye on the speedo and one finger on the brake, swing from the outside to the in and slide back out again by snapping the throttle open as you exit the bend.

Although Crazee Rider is a fair simulation of a motorcycle race it's not intended to be accurate. It's more of a cross between an arcade game and a simulation.

Points are gained by riding round the track and passing the opposition, but you can also ride alongside the computer bikes and ram them sideways off the track to gain bonus points.

If you end the race in the first six you automatically move on to the next race. This is at a different track and it'll take a few laps to familiarise yourself with the layout.

Unfortunately, you are not awarded this luxury as it's a one lap race. If you finish any lower than sixth you're out of the championship.

Overall, Crazee Rider is an exciting game and one which is likely to become as big a hit as Overdrive. It's fast, challenging and there's plenty to keep you entertained. Thoroughly recommended.

Joanne Hutcheson

Dunjunz (disc version)

S	G	P	V	O
6	8	8	9	8

SEVERAL months ago I managed to get my hands on the original tape version of Dunjunz. It is an enjoyable game for up to four players who control the Warrior, Barbarian, Wizard and Ranger on their journey through 25 levels of mazes. Along the way, they kill the evil Bashrs while searching for a mystical chalice.

During the search, you can pick up many useful objects to increase resistance to damage and improve your fire power. The screen is divided into four mini-screens which allows each player to move around the maze independently.

The trouble with the tape version was that the loading time seemed endless and each level of the maze had to be loaded in once the previous level had been completed. Therefore, it was with great excitement that I greeted the arrival of a disc version of Dunjunz.

No more writing a chapter of my memoirs while waiting for the game to load in. Add to that the bonus of a screen editor to devise even more devious and nasty levels for my friends plus a version of the game for the Master, the disc was the answer to all my prayers.

Price: £7.95. Supplier: BugByte, Victory House, Leicester Place, London WC2H 7NB. Tel: 01-439 0666

This version is just as addictive without any of the annoying loading problems of the cassette. Another bonus is that the Wizard is controlled from the Master's keypad giving extra room for the four players.

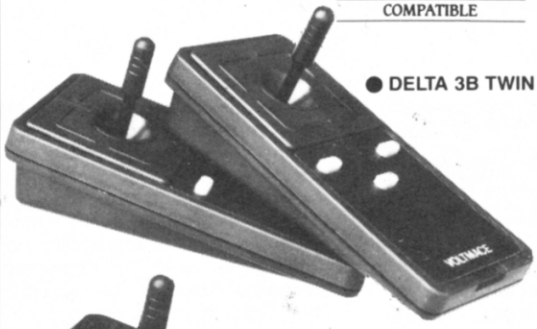
The screen designer is easy to use, although considerable planning is needed to produce a good screen and it's all too easy to produce near impossible screens.

By the way, the instruction inlay is wrong for the character controls so it's a matter of trial and error finding what to use. Saving a newly edited screen requires the pressing of Shift+S not Shift+5, but despite such niggles I found the disc good value for money, especially for Master users.

Desmond

VOLTMACE

COMPATIBLE



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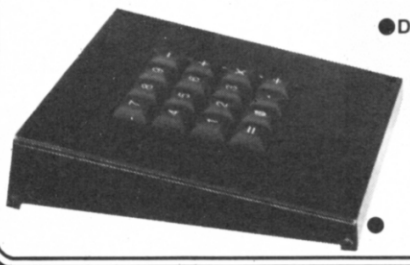

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A friendly face on your micro

Mike Mahon views a new front end rom for the BBC Micro

IT'S some time since I last reviewed a sideways rom for the BBC Micro. My comments then were "There's nothing much around now with any flair or excitement to recapture the enthusiasm of those early days when the next rom release was eagerly awaited". Now there is a new sideways rom to rekindle my enthusiasm and urge a review.

The ACP rom is basically a front end control panel – a friendly interface between the computer and you. The package comes with the 16k eprom, 29 page A5 format manual and a small jumper connector.

The manual was adequate although some more examples of user created screens would be helpful. The jumper is for connecting the pins of link 4 on the Master in order to provide an alarm facility. Unfortunately not all Masters have pins on link 4 making a solder link necessary. Furthermore, link 4 sits beneath any co-processor board.

ACP can be installed in any sideways rom socket or in sideways ram although on a Model B or B+ it would need to be in the highest priority to appear at switch on as the default language.

On the Master the default language may be set in the configure options. Alternatively it may be entered by *ACP or *ACP filename, the latter calling a user defined front screen from disc.

The appearance of ACP screens with their constant use of pull-down menus is very elegant. They are simple and uncluttered, allowing the operator to move around using cursor keys, Return activates an option, Escape leaves an option and *commands can be implemented from any screen.

The rom allows you to obtain information on the sideways roms and configurations of the machine, to access and interrogate disc directories and to control or reconfigure these options in a very simple manner without the need for a pile of manuals.

ACP provides a powerful control rom for the proficient user, but more important it enables instant access to the machine's facilities for the novice or computer-wary.

It is easy to set up Autoboot discs for different individuals providing them with access only to the functions they require avoiding the need for *commands, selection of directories and so on.

The four facilities offered by the default screen are Language, MOS, File, and Panel. Pull-down menus from the first three are shown in the multiple screen dump of Figure I.

Language simply lists the language roms fitted to the machine and allows the chosen one to be entered directly by pressing Return. This worked very well although it would be worthwhile warning you that memory content is about to be cleared first.

MOS provides powerful control over the machine setting as well as access to a calculator. The *Roms* menu lists the sideways rom or ram present and allows each to be unplugged or inserted. Ram images may be saved, loaded or cleared.

The *Configure* menu (Figure I) is

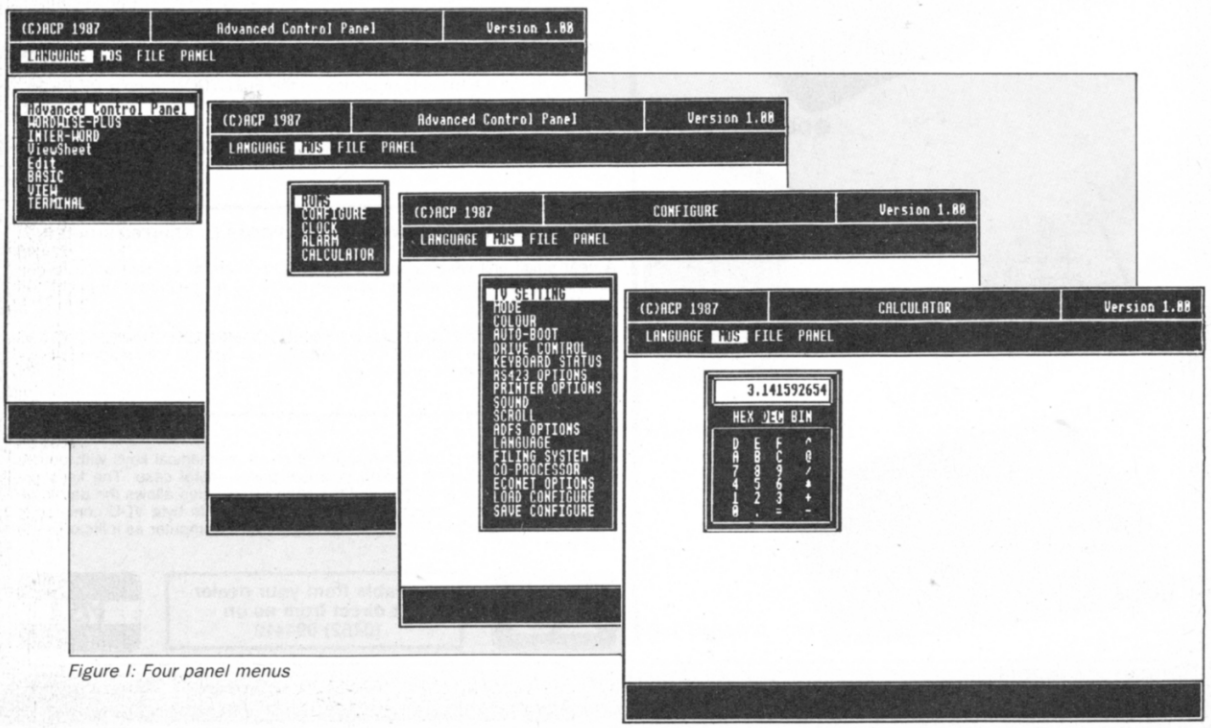

Figure I: Four panel menus

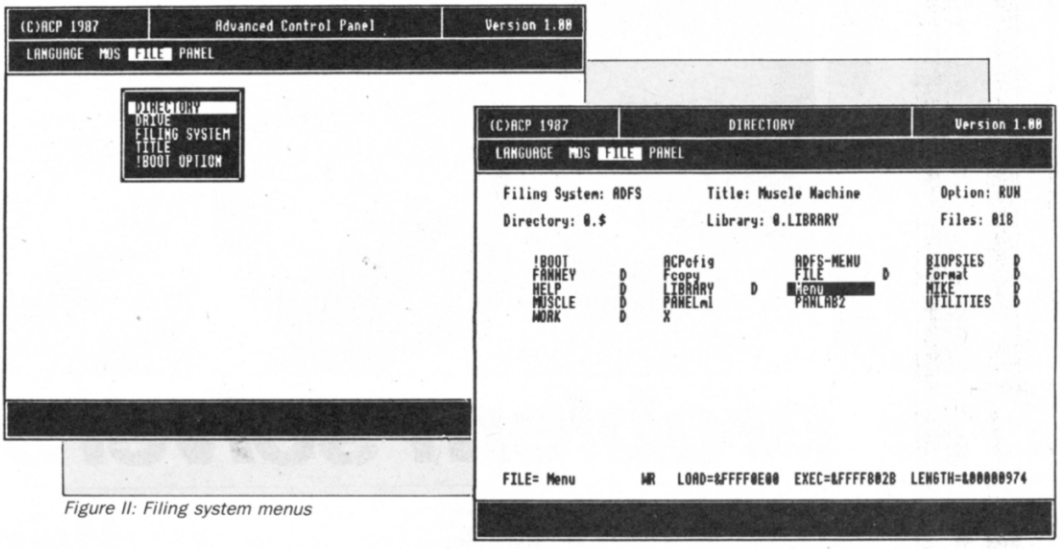

Figure II: Filing system menus

extremely powerful providing secondary menus for almost every option. You can save and load the configuration to disc making it easy to reset the computer after someone else has fiddled with it – ideal in a multi-user situation.

On the Master the clock may also be adjusted and an alarm or *command set to go off at a predetermined date and time.

A typical pocket calculator is also available (Figure I) allowing simple arithmetic to be performed in decimal, hexadecimal or binary. This is especially useful for converting values from one base to another.

File provides five options (Figure II) including *Directory* to provide a catalogue of the current filing system and allow movement between directories in ADFS. You can LOAD, CHAIN, *RUN or *EXEC programs and files. You can also DUMP (Control+D), TYPE (Control+T), DELETE (Control+K) any file or load directly into View (Control+W) or Viewsheet (Control+S).

Information is also provided on file length, load and execution address (Figure II). The only problem I had with this facility was when I accidently pressed Return while the cursor was hovering over a text file, it automatically loaded into memory and upset the machine and printer completely.

Other File options are *Drive* and *Filing System* which allow you to change the current selection.

Panel is the final default ACP option and opens the way to a multitude of user defined screens each with their own messages or commands. *Panel* provides LIST, LOAD, SAVE, NEW and BUILD in its pull-down menu. BUILD creates a new main control menu screen on which you can define his or her own titles each having their own windows.

Figure III shows my user-defined panel which autoboots when the machine is switched on. Of the eight titles the first provides a friendly message using ACP's text option.

Most useful are the latter four name titles (Mike, Fanny, Shirley, Neil) predefined to allow myself and colleagues to directly enter their own directories, required machine settings and so forth.

This is particularly efficient when used with ADFS and a hard disc. User defined panels are easy to set up as all options are chosen from menus or inserted as *commands.

There was one major bug: a user defined panel becomes corrupted following a disc directory access, but I am told this is being fixed on later versions.

ACP therefore provides an excellent user interface which is compatible with all BBC machines including those fitted with second processors.

It worked well with my Watford sideways rom and ram boards on a Model B although it wasn't able to switch on the sideways ram by itself. Furthermore, it didn't clash with a multitude of other roms.

On the Master it is superb but even on the Model B in sideways ram ACP stores the configure and other essential setup options in its last 32 bytes. Combined with battery backed ram a Model B, B+ or Electron can be turned almost into a Master to operate as a turnkey system.

ACP is outstanding in its ease of use, good looks and powerful control of machine configuration, especially on the Master, but most of all in its ability to provide a simple default or user defined interface between user and machine.

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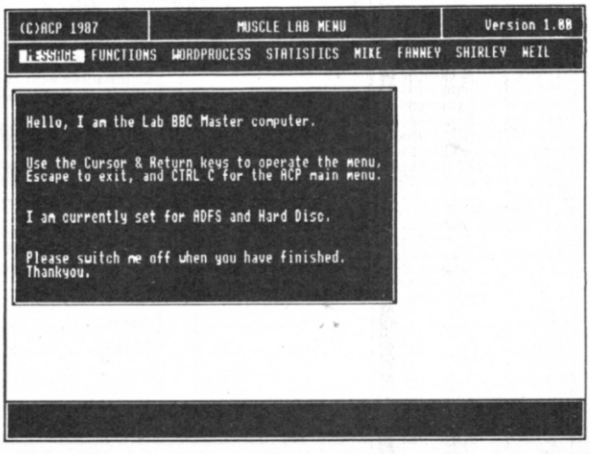
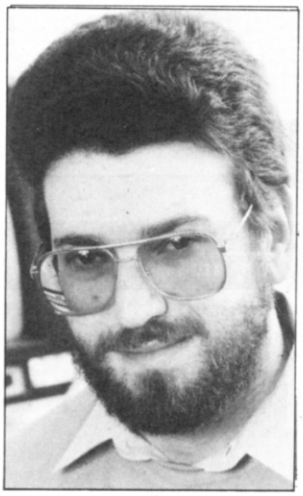
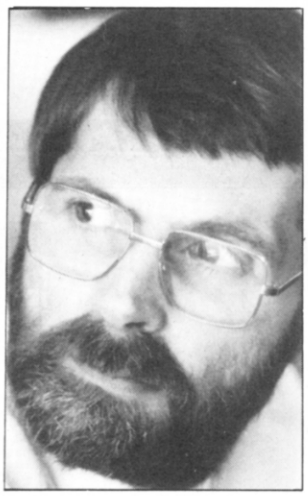
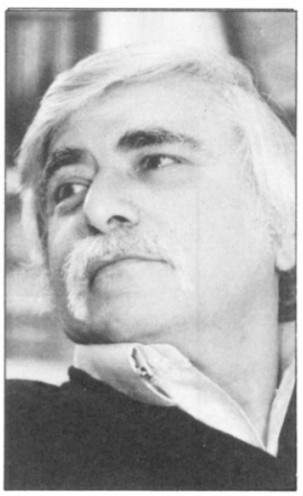


Figure III: A user-defined panel

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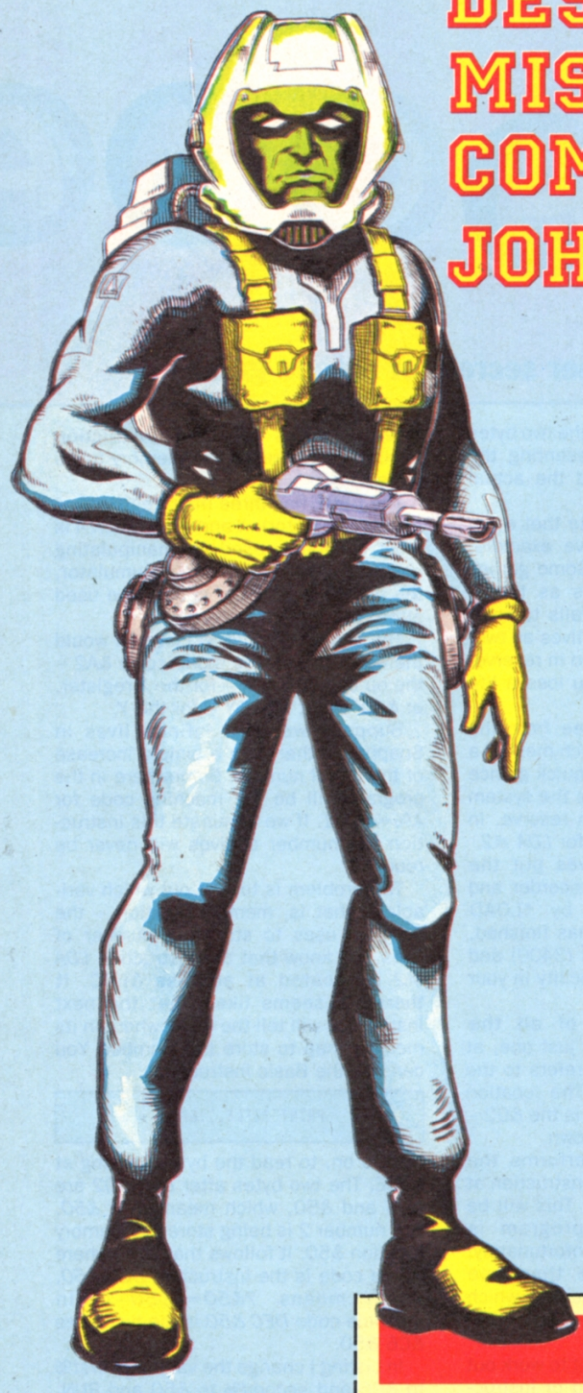

About the game

Codename Droid is the follow-up to the very successful Stryker's Run. This time round, Commander Stryker must pit his wits against the Volgans and steal their revolutionary new spacecraft.

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PART 7

Discover the inner secrets of arcade games

COMPUTER-BASED entertainment really began with TV ping pong. Then came Space Invaders and Pac-Man in the amusement arcades. These were refined to produce games like Galaxians and Mr Do, which in turn were succeeded by even more sophisticated products.

When the BBC Micro was first unleashed on an unsuspecting public, conversions of a number of these early popular arcade games were introduced. Space Invaders became Super Invaders, Pac-Man became Snapper (twice) and so on.

To follow on from last month's Snapper upgrade, let's look at the performance of pokes, and how you would go about implementing infinite lives and other personal modifications.

Three useful assets are a fair understanding of machine code, a machine code monitor, and a list of the 6502 instruction set. Previous issues of *The Micro User* have covered machine code programming for beginners – refer back to them if necessary.

The monitor program is needed because commercial games are always written in machine code, mainly for speed. If you do not have a monitor program, Listing I provides the main essential – a routine that will search through a piece of machine code for a specified group of bytes, and print the addresses of all occurrences.

It must be loaded fairly high up in memory, say at PAGE=&7000, to allow the game code to be loaded as well. The 6502 codes are listed on page 508 of the original User Guide. These codes come in useful when searching machine code programs for particular byte patterns. Unfortunately they have been omitted from the Welcome Guide supplied with the Master.

As a first example let's look at the cassette only Snapper Mark II. The game starts with three lives. To give ourselves, say, 10 lives change the machine code equivalent of *lives=3* in the program to *lives=10*.

In Basic we might use *A%=3*, take a number 3 and store it in a variable *A%*. When programming in machine code, memory locations are used instead of variables. For example, if we were to use location &70 instead of *A%*, the assembly language equivalent of *A%=3* would be:

```
LDA #3:STA &70
```

Load the *A* register with the number 3 and store it in memory location &70. If we assume that this is the instruction to specify the number of lives, we want to change *LDA #3* to *LDA #10*. Machine code is, however, just a series of numbers: *LDA #3* comes out as the two bytes &A9 &03 – the first representing the instruction and the second the actual number.

Unfortunately it's not quite that easy. Supposing, as in the above example, you start with three lives. Some games show the number of lives as three, ending when this number falls to zero. Others show the number of lives as two: one life in use, the other two in reserve. These games end when you lose a life with none in reserve.

It is normally easy to see from the display during the game which method a particular program uses. A quick glance will show that Snapper uses the system with one in use and two in reserve. In this case you need to look for *LDA #2*.

To give yourself 10 lives put the Snapper cassette in your recorder and type *OPT1,2 followed by *LOAD SNAPPER E00. When that has finished, note the execution address (3400) and run Listing I, or the trace facility in your monitor.

This produces a list of all the occurrences of &A9 &02 – just one, at &FDC. The address shown refers to the first specified byte: &A9. The location we actually want to change is the &02 – one byte after the value shown.

Entering ?&FDD=10 performs the required action. The 6502 instruction at &FDC now reads *LDA #10*. This will be acted upon when the program is executed by CALL &3400. Unfortunately, if there had been more than one occurrence of &A9 &02, deciding which one to change would have been a matter of trial and error.

The main problem in trying to work out pokes is that any command or instruction can be implemented in a number of different ways. Luckily programmers tend to follow patterns, because one often uses less memory than the others.

This is especially important in modern programs, which try to cram so much into the 32k machine that every byte is vital.

Zero page locations are normally used to store variables: an instruction to read from or write to zero page takes only two bytes, whereas the same instruction applied anywhere else in memory takes three.

The 6502 has three main registers, *A* (the Accumulator), *X* and *Y*, of which *A* is most commonly used for manipulating numbers. Instead of the Accumulator, the author of Snapper could have used either the *X* or *Y* registers.

The value of *first%* in Listing I would therefore have to be modified to &A2 – the op-code for LDX – for the *X* register, or &A0 – that for LDY – for the *Y*.

Suppose we want infinite lives in Snapper, rather than a simple increase of the initial number. Somewhere in the program will be the machine code for *A%=A%–1*. If we eliminate this instruction the number of lives will never be reduced.

The problem is to find out which variable – that is, memory location – the program uses to store the number of lives. We know that the instruction *LDA #2* is located at address &FDC. It therefore seems likely that the next instruction will tell the 6502 where in its memory map to store this number. You can use the Basic instructions:

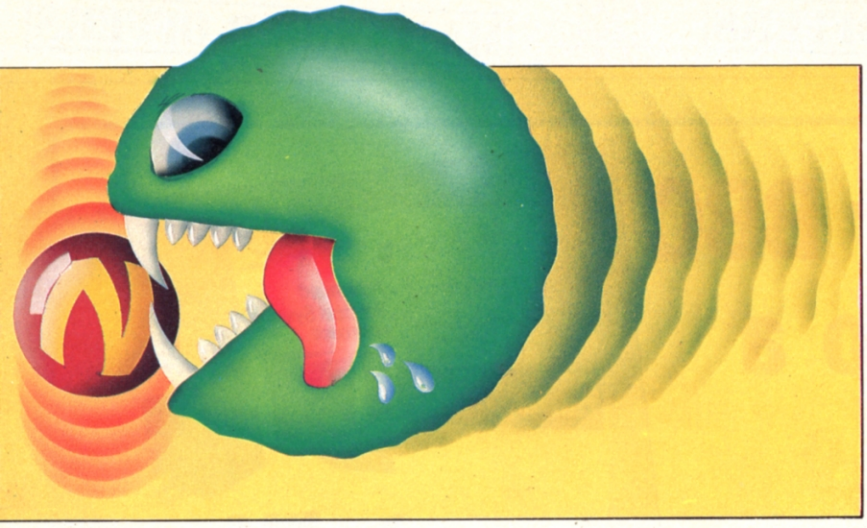
```
PRINT~?&FDE,~?&FDF
```

and so on, to read the bytes starting at &FDE. The two bytes after &A9 &02 are &85 and &50, which means *STA &50*. The number 2 is being stored in memory location &50. It follows that somewhere in the code is the instruction *DEC &50*, which means *?&50=?&50–1*. In machine code *DEC &50* is the two bytes &C6 &50.

In Listing I change the values of *first%* to &C6 and *second%* to &50 and RUN. The address it prints is that of the instruction to take away a life. We can substitute a relatively harmless instruction, for instance *LDA #1*. Unless the accumulator is carrying something important, executing this instruction will not affect the play of the game. Enter:

```
?&178F=&A9:?&1790=&01
```

And bingo, we now have infinite lives.



Early games were not as sophisticated as present-day offerings, and did not eat up so much memory. They could, therefore, store their variables in the main memory map, rather than in zero page. Arcadians is one game that works in this way.

As we have already seen, however, we cannot take anything for granted. Although Arcadians only displays two lives, it actually works as "start from three, end at zero". Thus the techniques used for Snapper can be applied to Arcadians, but with a few subtle differences.

Start by typing *OPT 1,2 and *LOAD ARCADIANS 1900. The main game code is longer than Snapper and loads into a different area of memory, so we must change the values of *start%* and *length%*, to &1900 and &4C00 respectively.

As previously mentioned, Arcadians counts down from three lives to zero. Its instruction to specify the number of lives is, therefore, *LDA #3*, so we must change the value of *second%* to &03. Type RUN to start the search. This displays all occurrences of &A9 &03 – the correct one for the number of lives is, in this case, &4EBD.

Once again we can change the following byte, &4EBE, to give ourselves more lives. The next three bytes read &8D, &FC and &05 – the 6502 instruction *STA &05FC* – so we know that the number of lives is stored in location &05FC. Note that the instruction code for STA has changed from &85 to &8D, to signify that there are two following bytes, rather than just one.

To obtain an infinite lives routine search for the instruction *DEC &05FC*. Because the DEC instruction now consists of three bytes, the value of the DEC byte itself has changed from &C6 to &CE. Thus we must change the value of *first%* to &CE.

```
  10 REM Machine Code Trace
  20 REM by Hac-Man 1987
  30 REM (C) The Micro User
  40 start%=&E00:length%=&2677:first%=&
A9:second=&02:third%=&00
  50 FOR I%=start% TO start%+length%
  60 third%=?I%+2
  70 IF ?I%=first% AND ?I%+1=second% AN
D ?I%+2=third% THEN PRINT ~I%
  80 NEXT
```

Listing I: Five line machine code trace

Until now, the variable *third%* has been doing nothing. As careful examination of the program will show, it has always been set to the value two bytes after the current one. Delete line 60 and modify line 40 so that the value of *first%* is &CE, as above, *second%* is &FC, and *third%* is &05. Then type RUN.

Two values are shown – &583E and &592F – but we only need to change the first. For some reason best known to the author, the second *DEC &05FC* instruction is immediately cancelled out by an *INC &05FC*. How strange...

Once again, we can replace the *DEC &05FC* with *LDA #1* but we need to add a NOP – no operation – at &5840 to cancel out the third byte of the DEC. CALL &3F00 to start the game.

The above infinite lives pokes for Snapper and Arcadians search for the 6502 instruction DEC followed by either one or two bytes. Most commercial arcade games use one of these methods to decrement a memory location. Another fairly common method uses a 6502 register as well as a memory location. In assembly language it might look like this:

```
LDX &70:DEX:STX &70
```

This reads the contents of &70 into the X register, decrements X and stores the new value back in &70. To keep the number of lives from being reduced, we'd want to replace DEX with NOP.

A similar decrement operation using the A register works in a slightly different way. The Accumulator cannot be decremented directly. Instead the 6502 instruction SBC – subtract with carry – is provided. A routine using A, equivalent to that shown above using X, would read:

```
LDA &70:SEC:SBC #1:STA &70
```

Two games using this routine that immediately spring to mind are Jet-Pac and Commando. In such a case, to get infinite lives we can change *SBC #1* to *SBC #0*. Altering memory directly is obviously quicker and more efficient, but this routine is sometimes used.

Another useful – some would say essential – poke allows you to start on a higher level. This will let you practise on higher levels, or simply skip the early levels because they are too easy. Although it is natural to think of the first level of a game as being level one, the program generally counts from zero.

To demonstrate this, I'll use Superior's Wallaby. There are two versions – the first released as an individual title, the second on the Superior Collection Volume 1 compilation. Unlike any of our previous examples, Wallaby is a combination of Basic and machine code. We cannot, therefore, load just the last part.

For the original version of the game, type:

```
PAGE=&2C00
LOAD"WALLY2"
2 *LOAD WALLY3
5 END
RUN
```

If you have the Superior Collection version:

```
LOAD"WALLY1"
*FX10 0
1895 END
```

Type RUN, and when the prompt appears, enter:

```
PAGE=&2C00
LOAD""
5 END
RUN
```

In either case, type *PAGE=&7000* and OLD to return to Listing I. Modify the original listing so that the value of *start%* is &0B00, *length%* is &2100, and *second%* is &00; then type RUN.

There are, unfortunately, a number of occurrences of &A9 &00 – the correct one is at &1866 (&186E for Collection owners). As we have seen, the byte to change is the one after the address shown. In order to start the game, in both versions type GOTO 6.

In general, pokes to access higher levels can be obtained in a similar way to that used for increasing the number of lives – just remember to search for 0 or 1, rather than 2 or 3.

Unfortunately we seem to have run out of space again. Many thanks to all who have sent in so many excellent tips. We will feature as many as possible in next month's column. Until then, happy Hac-ing.

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TO ORDER TURN TO THE FORM ON PAGE 141

ARMchair reading

Steve Turnbull dips into a new book

IT has been a long time since I've read something new when it comes to BBC Micros. The number of "How to Program" books for the Acorn range is astronomical and the majority is, frankly, run-of-the-mill dross.

So it was with considerable interest that I received the ARM Assembly Language Programming book written by Peter Cockerell. It is about a totally new microprocessor chip in a revolutionary micro – the Archimedes.

Books of this ilk invariably – and quite correctly – cover the basic concepts of how microprocessors work, how the chips link together and so on. The problem is how to make it easy reading for those who know, and not too high a gradient for those who don't.

Thankfully, Pete Cockerell has a very comfortable style that manages to make even these old chestnuts easy to absorb and yet still keep up the pace.

Although quite small, compared to most programming manuals – just 200 pages of A5 format – the amount of information crammed in is stunning. The author manages to handle the complex subject matter deftly and moves from one area to the next in a smooth progression.

Further chapters cover the ARM chip from a description of its internal structure and how it addresses memory, through a description of the instruction set with plenty of examples, up to an overview of the more sophisticated data storage techniques, again with sample programs.

An interesting point is that throughout he refers to "the ARM environment you are most likely to be using". He doesn't mention any particular computer, but chapter 4 clarifies the statement as it is devoted to using the in-line assembler of BBC Basic for assembling your ARM programs.

The book is well written, well presented and informative. One word of warning, this is not about programming as a subject in itself, so if you know nothing about programming try something else first. Where further detailing of a technique is not required you are referred to a more appropriate source.

This is clearly the definitive ARM programming book – and will undoubtedly be well read.

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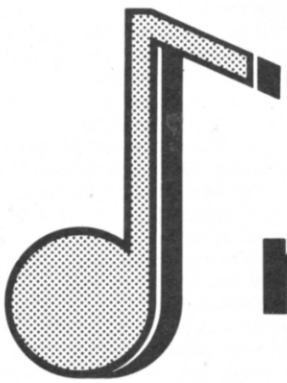

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ISLAND LOGIC SYSTEM SOFTWARE SYSTEM

Customised composing

Ian Waugh investigates a powerful music system for the BBC Micro

THE story began back in '85 with Hybrid's Music 500, generally regarded by all as a *good thing*. It was an eight voice digital synthesiser controlled from the BBC Micro with a new MCL (Music Composition Language) called Ample (Advanced Music Production Language and Environment).

Unfortunately, it took a lot of time and effort to make it musically effective. The manual didn't help either, but the facilities offered were amazing. The sounds it was capable of producing compared well with dedicated synthesisers costing two and three times as much.

I use the past tense because the Music 500 is no longer in production, although you can still pick them up cheap (less than £60) from some retailers. In its place we have the Music 5000.

To clear a point of possible confusion, the hardware in both is identical except for a modification to the 5000 which makes it Master-compatible. This was necessary due to Acorn's unbelievable continuing policy of non-upward compatibility with their computers – in this case regarding the 1 MHz bus.

The Music 500 was designed specifically for the BBC B. My 500 happens to work with my Master, but this is not guaranteed, so check with your own equipment before buying.

The major difference between the two systems is the software – and what a difference. The new version is rom based (the original Ample came on cassette) freeing much precious memory for music storage.

It has also been completely redesigned, to give a whole new front end called the Studio 5000 which greatly simplifies many of the more complex operations in the old system.

The basic unit in Ample is the word and it can contain anything or be defined to do anything. A word can contain a riff, a chord sequence, an instrument definition or call up an action such as a tempo change.

Words can be defined in terms of other words, and eventually there will be a single word at the top of your program which will start all the music lines playing at once.

Operations are stack based and Ample syntax is similar to the postfix notation used in Forth. If you're not a postfix fan don't let that put you off, because the system is quite easy to understand and use.

No stack use is necessary except for advanced programming. In normal use you simply put the number before the word, for example

```
7 MODE "filename" LOAD 8 VOICES
```

and so on.

For the language buffs, Ample is a complete language – in fact the new software was written largely in Ample (work that one out). Us lesser mortals, however, can simply use the music parts of the language to produce music.

Hybrid has designed the system and software to be fully expandable, and new features can be used by installing new software modules. Those supplied with Studio 5000 are Mixing Desk, Notepad and Staff Editor which are loaded only when they are required. A prime example of Hybrid's modular approach is the new keyboard, the Music 4000. The software to drive it loads like any other module and fits faultlessly into the system. It is fully integrated – that's the way to design software.

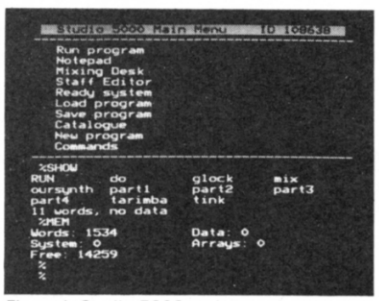

Figure I: Studio 5000 main menu screen

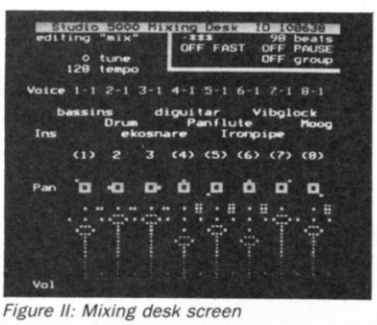

Figure II: Mixing desk screen

The real joy of the new system is its ease of use. Facilities which could be squeezed out of the 500 only with blood, sweat and brute force can be obtained from the new software with the minimum of effort.

The manual is a vast improvement too, and leads you gently through the modules. The first is the Mixing Desk, so we'll follow suit.

Figure II shows a Mode 7 display of the mixing desk console. It has eight channels – one for each voice – with faders, pan pots and volume meters. The instruments playing on each voice are shown above the pan pots.

Pressing Shift clears the bottom half of the screen and shows a list of instruments which can be selected with the cursor keys. Releasing the Shift key will transfer that instrument to the mix.

Changing instruments on a voice can take place while the music is playing, so you can hear how the piece sounds as you make alterations. This concurrency is an important part of the Ample language and you'll find you can alter most parameters while music is playing.

You can pan a sound through seven stereo positions, transpose the piece and alter the tempo. When you've produced a mix you like you type MAKE and the system will produce a word containing all the settings. You can produce several different mixes or submixes and use them at any point in the music.

You can pause and fast forward the music and step through it a beat at a time. Many of these features are only possible with a computerised system.

The next module in the book is the Staff Editor. One of the criticisms levelled at Music 500 was its lack of any form of traditional music notation input. That has been rectified.

It now supports the full range of notes, rests and accidentals, along with slurs, triplets, duplets, dots and ties. You don't have to use bar lines, but if you do, the system will automatically check the length of each bar.

You can define the on-time of the notes to produce legato and staccato phrasing, and include dynamics (volume) and accents.

The method of note entry and editing is similar in many ways to that used by Island Logic's The Music System, but Hybrid's editor is far more comprehensive. Chords can be entered too, although the notes are staggered across the stave rather than appearing vertically. It looks odd at first, but is quite easy to adapt.

You can program non-standard key

The complete Hybrid Music System - so far!

signatures and define words relating to performance expression. You can also produce percussion patterns on the treble clef.

The Staff Editor is ideally suited to anyone working with traditional music and perfect for copying traditional scores from sheet music.

More than that, the system can translate the music you produce on the stave into Ample's MCL in the Notepad.

The Notepad brings you nearest to the Ample ideal. It is a screensized text editor which can be used to produce music or create or edit instrument sounds.

Ample music notation is simple. Notes are called by their usual names A to G and the duration and octave determined by initial numeric settings.

Upper case letters indicate a rise in pitch from the last note and lower case represents a fall in pitch.

Notes can be lengthened either by specifically increasing the duration or, more usually, by putting a backslash character (/) after the note.

Here's are the first four bars of Good King Wenceslas (only three months to Christmas):

```
24, 0: CCCD ccg/ AgAB C/C/
```

The first figure (followed by a comma) sets the beat length and the next figure (followed by a colon) sets the octave.

This notation will be familiar to Music 500 owners and is arguably easier to understand and more logical than traditional notation.

It supports chords and the full range of accidentals, and because it is text-based it is fairly easy to manipulate notes and music with programming techniques such as loops.

It also provides elements not included in traditional staff notation, such as negative notes (going back in time for pickups) and strummed chords.

It has built-in special effects (which can also be used on the stave) such as echo which can be used to create reverb effects and true echoes. These can be detuned, transposed and panned across the stereo image.

Continuous changes in tempo and volume are rare in computer-based music, but are standard fare in the Hybrid Music System. They can even be used to produce autopanning and slide effects.

You can edit words in the Notepad which were created in the Staff Editor and the Mixing Desk, and this is really the module on which others hang. It is extremely powerful.

Instruments are designed and edited in the notepad. Switching to Panel Mode allows you to edit instrument characteristics by moving the cursor between controls.

As in the Mixing Desk, selection is made by holding down the Shift key and a list of options appear at the bottom of the screen.

With the original Ample software you had to build an instrument from scratch by creating your own waveforms, amplitude and pitch envelopes.

Now you select from 14 waveforms, 17 amplitude envelopes and 17 pitch envelopes. You can also add synchronisation and ring and frequency modulation.

A unique facility is the ability to design your own panels. You could call up an unmodulated piano sound and type in controls for frequency modulation and ring modulation, in any spare area of the panel.

The limited number of waveforms and envelopes is not as restricting as may at first appear. The ease of instrument creation helps offset not having full programmability.

It would be easy to add an additional waveform editing module to the system, and rumour has it that one is under development.

The manual contains graphic displays of all waveforms and envelopes, which is extremely helpful. The system loads with 14 preset instruments and the manual contains details of another 25 for you to type in. You'll get lots more from the demo pieces, and the new Music 4000 software adds a further 80 instruments to your collection.

The system generates 16 sound channels, which are normally paired to produce eight two-channel voices, but you can use all 16 on one voice if you wish. Individual voices can be transposed, detuned and given their own stereo position.

Another criticism levelled at the Music 500 (and the Music 5000 until now) was the lack of a keyboard for real-time input. The Music 4000 puts that right. It has a four-octave full-size keyboard (C to C) which plugs into the BBC Micro's user port. It's similar to ATPL's Symphony keyboard, and Symphony owners can buy an upgrade kit. New Studio 5000 software includes modules to drive the keyboard.

Not only can you play the Music 5000 in real-time, but it is possible to call up six special keyboard effects: Trans, Scale, Spread, Reduce, Expand and Split.

Trans lets you transpose the pitch range in semitone increments over any range. Scale sets the overall pitch scaling in 16th of a semitone increments. It defaults to 16 which produces the normal semitone interval between keys.

A setting of 8, for example, would produce quarter tone intervals and 32 would produce a whole tone scale (as used in the intro of Stevie Wonder's You Are the Sunshine of My Life).

You can even reverse the intervals by giving it negative numbers. A setting of -16 would place the high notes at the bottom of the keyboard. Weird.

Spread controls the stereo position of the voices and lets you pan successive

Turn to Page 48 ►

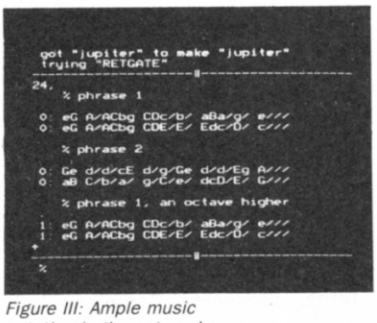

Figure III: Ample music notation in the notepad

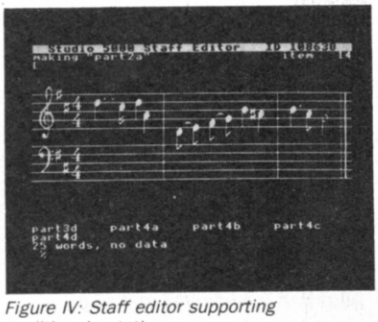

Figure IV: Staff editor supporting traditional notation

◀ *From Page 47*

voices around the stereo field. Reduce cuts the volume of successive voices for use with echo effects.

Expand lets you produce a short sequence of notes or a whole chord from a single keypress. These are programmed by pressing the footswitch and playing the appropriate notes. It is easy to produce effective echo and arpeggio effects, especially, when used with Spread and Reduce.

Split is used to assign different voices to each octave and would probably be used mainly with percussion voices.

As with instrument panels, you can customise the keyboard panel and store different designs as words. Useful additions would be fine tune and brightness controls.

In the Recorder module you can record up to eight separate tracks. This works in a similar way to a multi-track tape recorder or Midi sequencer.

The actual number of parts you can record depends upon the number of voices used by each instrument. With an instrument using all eight voices you would only be able to record one part, albeit in eight note polyphony.

A metronome gives you a count in and you can make any combination of parts play back while you record. The system includes a quantisation option which sets each note on the nearest specified division of the beat. This helps tidy sloppy timing.

If you would rather play music than type it in, you can produce a piece of music entirely from the keyboard. Parts can be independently sectioned and repeated so you could record a two-bar bass and repeat it eight times, while adding the melody on top.

Recordings are stored as Ample words just like any other piece of music and can be loaded into the Notepad or the Staff Editor for further processing. This is a powerful feature and rare in music programs.

You can enter music in steptime from the keyboard, too. If you play the keyboard while in Notepad the notes appear in Ample notation. In the Staff Editor they appear on the stave.

Product	Price
Music 5000	£161.00
Music 500 Upgrade	£69.00
Music 4000 Keyboard	£169.00
Music 4000 Symphony Upgrade	£47.00
Footswitch	£11.50
Music 2000 Midi Interface	£TBA
Music 1000 Amplifier	£110.00
COSMIX Album (floppy disc)	£4.95
Ample Bytes Back (floppy disc)	£4.95
Demo Audio Cassette	£2.95

All prices include VAT and p&p.

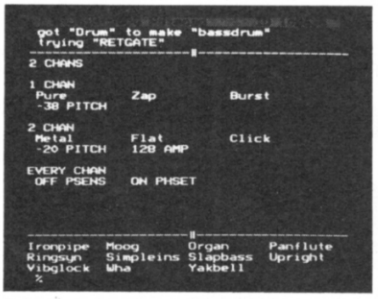

Figure V: Editing an instrument in the notepad

Durations are extended in the Notepad by pressing the footswitch. Each press adds a backslash character.

In the Staff Editor the footswitch extends the note's duration up to a semibreve. It would have been nice if it had wrapped around but you can select durations manually with Shift and the cursor keys.

The Music 4000 disc contains demo pieces even more impressive than those on the Music 5000 disc. Some come from Hybrid's Ample Albums called Cosmix and Ample Bytes Back.

These are albums on floppy disc and you need the Music 5000 to play them. If you have the system then do buy at least one.

Cosmix is full of original material and is nothing less than a brilliant display of the power of Ample. The other album contains tunes in the Hooked On Classics tradition.

The Music 4000 manual is written in the same clear style as that of the Music 5000. If you want to delve even deeper into the system watch for the Programmer's Guide.

The Hybrid Music System sounds like good news, but more than one musician will wonder if it can link to other equipment – via Midi, perhaps.

Well the Music 2000 Midi interface has been in existence for a while and we are only waiting its launch.

Hybrid has also developed a new amplifier with three headphone outputs for use in the classroom.

The system is ideally suited to educational use and stands head and shoulders above Yamaha's CX5 computer, which until recently had been the only choice in educational establishments.

Apart from the fact that Yamaha has ceased production of the CX5, it has never had any decent software support and existing programs are clumsy and limited.

Hybrid is developing a suit of programs, Ample Microworlds, which are one-screen interactive and *practical* applications for use in education. Topics include composing drum machine patterns, producing Gamelan music, making retrograde music and the assisted composing of rounds.

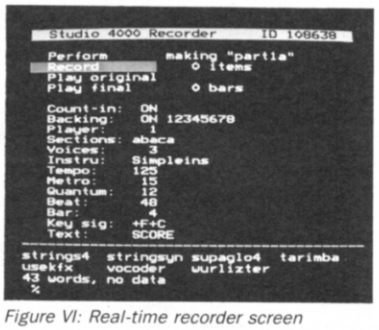

Figure VI: Real-time recorder screen

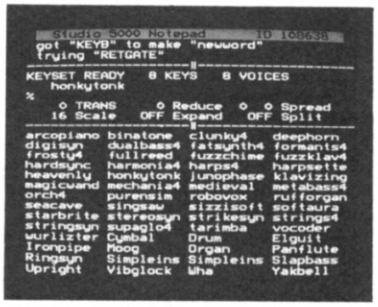

Figure VII: Keyboard screen showing some of the available instruments

The Hybrid Music System is suitable for recording, arranging and composing and it will particularly interest anyone wanting to apply computer power to the composition process.

Existing (or potential) Music 500 owners may consider the wisdom of upgrading to the Music 5000. If your 500 has been gathering dust in the cupboard under the stairs there is little doubt that it will give it – and you – a new lease of life.

The launch of the Midi interface takes the system into the professional arena, and probably quells any reason you can think of for *not* buying it.

If you tried to bring together all the facilities of the Hybrid Music System – synthesiser, programmable voices, stave editing, real- and step-time recording, a mixing desk plus the computing power of the Ample language – you would need a small fortune.

Well, let's face it, you couldn't do it because there's nothing to compare the system with. If you want to hear it in action send for the demo cassette.

Yes, I admit I'm hooked, I used the Music 500 when it was launched, but the new software makes it so much easier to explore Ample's many musical facets. It has got to be one of the best and cheapest ways into computer music.

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MU9

Pete Cockerell demonstrates the power of the Archimedes

ONE STEP BEYOND...

IT'S easy to describe new computers as bigger, better and faster, but what it all comes down to is ease of programming. And the simplest way to show this is by demonstration.

Program I is for the Archimedes and assembles a short piece of machine code which takes a string and draws it up in big block characters based on the 8 by 8 definition. Each character block is the size of a normal character from the selected mode.

This program would follow the same algorithm on a BBC Micro – even use some of the same operating calls – but it illustrates the similarities, improvements and the major differences.

Line 100 has the first Basic improvement: If you type SAVE without a filename, Basic looks for a REM statement with > as the first character and then uses the next word as the filename. At line 140 the 16 colour 320 x 256 mode is displayed.

At line 160 we get the first new command – SYS. This allows operating system routines to be called by name or by assigned number with the registers set to the required parameters.

One such routine converts a routine name to the routine number and the result can be assigned to variables after the call has been made using the TO option.

So, line 160 asks the operating system to give back the number of the OS–Writel routine in the variable *Writel* so that it can be used from the machine code.

The ARM chip possesses 16 registers (one of which is the dedicated program counter) in which to store data and lines 180 to 270 specify names that the registers will be called in the code.

The rest of the Basic from 280 to 320 just initialises variables for the osbyte, osword and VDU calls that are to be made from the code. In line 330, 200 bytes is allocated for the machine code.

We'll skip the machine code for the moment and go over the interesting points in the rest of the Basic. At line 990 is the extended COLOUR command allowing each of the six colours being used to be redefined randomly to one of the 4096 shades. Only 16 levels of each colour (red, green and blue) are available – but the value is scaled up to 256 to cater for future expansion.

Lines 1050 to 1070 set the parameters to be passed to the machine code. When the code is actually invoked, at line 1080, registers r0 to r7 are given the values of A% to G%.

Now let's return to the machine code starting at line 370. When the machine code is entered register 14 – the link register – contains the return address (the link back to the calling code). This is immediately saved on the Basic stack at line 400, using the save multiple registers instruction with FD options meaning decrement the save address before each save operation.

Only r14 is in the list of registers between the curly brackets so only that one is saved. Then registers r0, r1 and r2, are copied over to the registers we have chosen to store the string pointer and the X-Y position of the string.

Next we come to the command SWI, which stands for SoftWare Interrupt. This is perhaps the most important instruction in the whole machine.

Each SWI is used for a particular operating system or application command, although since there are 2^{24} (over 16 million) possible SWI commands they have not all been allocated yet. There is a whole group (256) of SWI commands each of which sends one of the 256 Ascii characters to the VDU drivers, the first of these SWIs is OS–Writel, the number of which we found at line 160.

So lines 440 and 450 tell the machine to invoke the SWI which starts the redefine character sequence for character &80. In BBC Basic terms this would be

```
VDU23,&80,...
```

Lines 460 to 510 send eight &FF's to the VDU drivers to redefine character &80 as a solid block. But notice how at lines 490, 550 and 860 the BBC Basic V assembler allows you to call an SWI by name.

Starting at line 520 is the main program loop the first command of which demonstrates the power of the ARM codes:

```
LDRB char,[ptr],#1
```

This means load a register called *char* with a byte found at a location pointed to by a register called *ptr*, and then increment *ptr* by 1.

We have decided that the end of string marker is any byte with a value less than 32. Line 540 performs the check then line 560 instructs the ARM to load the program counter, pc, with the return address (which performs the RTS instruction) from the stack, IF the value of *char* is less than 32.

Every ARM code can be conditional and this return instruction demonstrates how this works. The LDM (load multiple registers) at line 560 is followed by the LT meaning Less Than, the FD means the same as before. Line 550 is optional, to include it just omit the first semicolon.

The BL command is Branch and Link, which is similar to JSR, and puts the return address into the link register, r14. So line 570 calls the subroutine called *doChar*. Then line 580 performs a branch, B, back to the main loop. In this

case B is the equivalent of JMP because there are no conditions attached to it.

Moving on to *doChar* the character value is stored in the parameter block, lines 620 and 630 set up the parameters for the OS–Word command which gets the character definition into the parameter block.

The ADR command is actually a pseudo-operator which is used to load an address relative to the position of the command into a register.

In a system designed around the ARM chip and its three support chips you can never be exactly sure where in memory your program is going to be executed because everything can be relocated. This means that loading and saving data to a specific address is very risky because your whole program may have been moved.

In fact this is an advantage rather than a disadvantage, because it forces code to be relocatable. And the ARM assembler provides you with the ADR pseudo-operator to allow you to load and save to a location relative to the position of the command. The ADR instruction is assembled as two ARM instructions to calculate the relative address.

In lines 650 and 660 the registers are set up to display each character line. From 680 to 730 the cursor is placed at the position of the first character of the row.

At line 730 the relevant byte of the character definition is taken from the parameter block using the load from an address held in a register offset by the value of another register and at 740 a mask is loaded which is used to test each bit at line 760.

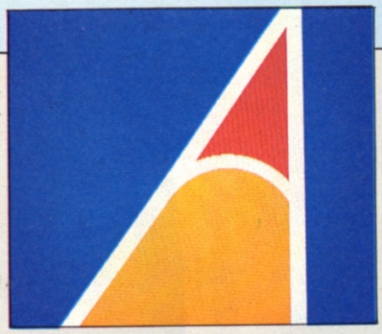
Lines 770 and 780 show the real power of the conditional commands: Depending on whether the bit being tested is zero (eq) or not (ne) the appropriate SWI command is executed and a space or a blob is printed.

Once this is done the mask is shifted right one bit position and the loop re-executed until all eight bits have been tested. Then the whole routine is repeated for each row of the character definition.

Finally at line 890 the link register is moved into the program counter performing the return from the subroutine. Notice that because no other routine, apart from operating system routines, were used, the contents of the link register did not need to be saved on the stack.

So there you have it, a brief introduction to using the Basic V assembler, you can see that the principles are the same as earlier versions – but the power is far beyond any other micro available.

● *Pete Cockerell is the author of ARM Assembly Language Programming published by Computer Concepts.*

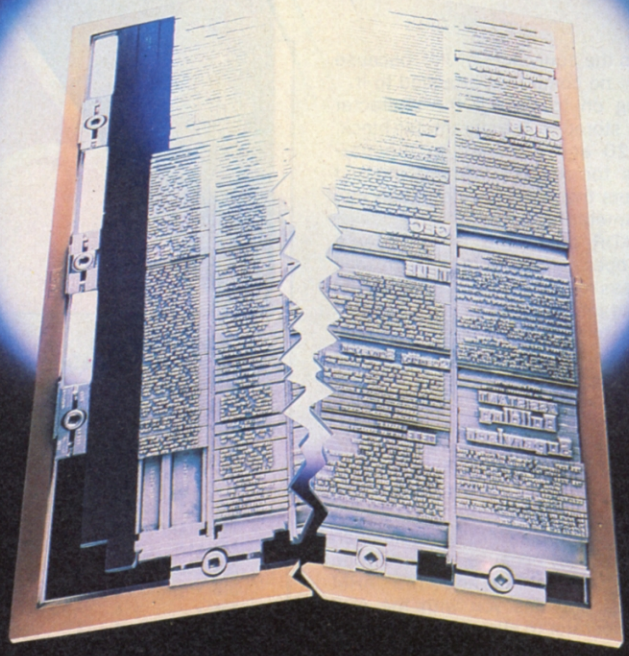


```
  100 REM >BigChars
  110 REM ARM Assembler program
  120 REM by Pete Cockerell, 1987
  130 REM (c) The Micro User
  140 MODE 9
  150 REM Get SWI number for WriteI
  160 SYS "OS_SWINumberFromString",,"OS_
WriteI" TO WriteI
  170 REM Declare register numbers
  180 blkPtr = 1
  190 ptr    = 3
  200 char   = 4 : byte = 4
  210 x      = 5
  220 y      = 6
  230 ty     = 7
  240 row    = 8
  250 mask   = 10
  260 sp     = 13
  270 link   = 14
  280 readDefn = &0A : REM OSWORD to rea
d definition
  290 readPos  = &86 : REM OSBYTE to rea
d pos & vpos
  300 blob     = &80 : REM Character we'
ll redefine
  310 redefine = &17 : REM redefine a ch
aracter
  320 tabXY    = &1F : REM print tab(x,y
)
  330 DIM code 200   : REM Space for cod
e
  340 FOR pass=0 TO 2 STEP 2
  350 P%=code
  360 [ opt pass
  370 ;On entry:
  380 ; R0 points to the string, termina
ted by ctrl char
  390 ; R1, R2 contain tab(x,y) for star
t of string.
  400  stmfd (sp)!,{link}  ; Save the re
turn address
  410  mov ptr,r0          ; Save addres
s of string
  420  mov x,r1            ; Save start
pos
  430  mov y,r2
  440  swi WriteI+redefine ; Redefine bl
ob char to inv " "
  450  swi WriteI+blob
  460  mov r1,#8
  470  mov r0,#&FF
  480 .redefLoop
  490  swi "OS_WriteC"
  500  subs r1,r1,#1
  510  bne redefLoop
  520 .loop
  530  ldrb char,[ptr],#1  ; Get char an
d increment pointer
  540  cmp char,#ASC" "    ; Is it a con
trol char?
  550;  swilt "OS_NewLine" ; If so, do n
ew line
  560  ldmltfd (sp)!,{pc}  ; and return
  570  bl doChar           ; Otherwise p
rint it
  580  b loop              ; and loop
  590 \---
  600 .doChar
  610  strb char,parmBlock ; Save char i
n parameter block
  620  mov r0,#readDefn    ; r0 contains
 reason code
  630  adr r1,parmBlock    ; r1 points a
t parm block
  640  swi "OS_Word"       ; Read defn.
  650  mov ty,y            ; y co-ord. o
f current row
  660  mov row,#1          ; row count
  670 .doRow
  680  swi WriteI+tabXY    ; Move to sta
rt of row
  690  mov r0,x
  700  swi "OS_WriteC"
  710  mov r0,ty
  720  swi "OS_WriteC"
  730  ldrb byte,[blkPtr,row] ; Read def
n. byte from this row
  740  mov mask,#%10000000 ; Mask at bit
 7
  750 .rowLoop
  760  tst byte,mask       ; Is it set?
  770  swine WriteI+blob   ; If so print
a blob
  780  swieq WriteI+ASC" " ; else print
a space
  790  movs mask,mask,lsr #1 ; Shift mas
k right -> carry
  800  bcc rowLoop         ; If no carry
, more to do
  810  add ty,ty,#1        ; Increment y
co-ord
  820  add row,row,#1      ; and row num
ber
  830  cmp row,#8          ; Last row?
  840  ble doRow           ; No, so do n
ext one
  850  mov r0,#readPos     ; Get current
 pos and vpos
  860  swi "OS_Byte"
  870  ands x,r1,#&FF      ; Update x fr
om new pos
  880  moveq y,r2          ; If 0, updat
e y from new vpos
  890  mov pc,link         ; Return
  900 \---
  910 .parmBlock
  920  EQUB 0:EQUD 0:EQUD 0 ; 9 bytes fo
r parameter block
  930 ]:NEXT
  940 DIM A% 100
  950 PROCprint("Hello",2,1)
  960 PROCprint("There",4,3)
  970 PROCprint("World",6,5)
  980 REPEAT FOR col=1 TO 6
  990 COLOUR col,RND(256),RND(256),RND(2
56)
 1000 NEXT:UNTIL INKEY$(50)<>""
 1010 VDU 20:END
 1020 DEF PROCprint(str$,fore,back)
 1030 COLOUR fore
 1040 COLOUR back+128
 1050 $A%=str$
 1060 B%=POS
 1070 C%=VPOS
 1080 CALL code
 1090 ENDPROC
```

Program 1

The old technology is dead.

Join the revolution!



The printing industry has been rocked to the core by an ever-growing series of developments in the exciting new field of Desktop Publishing.

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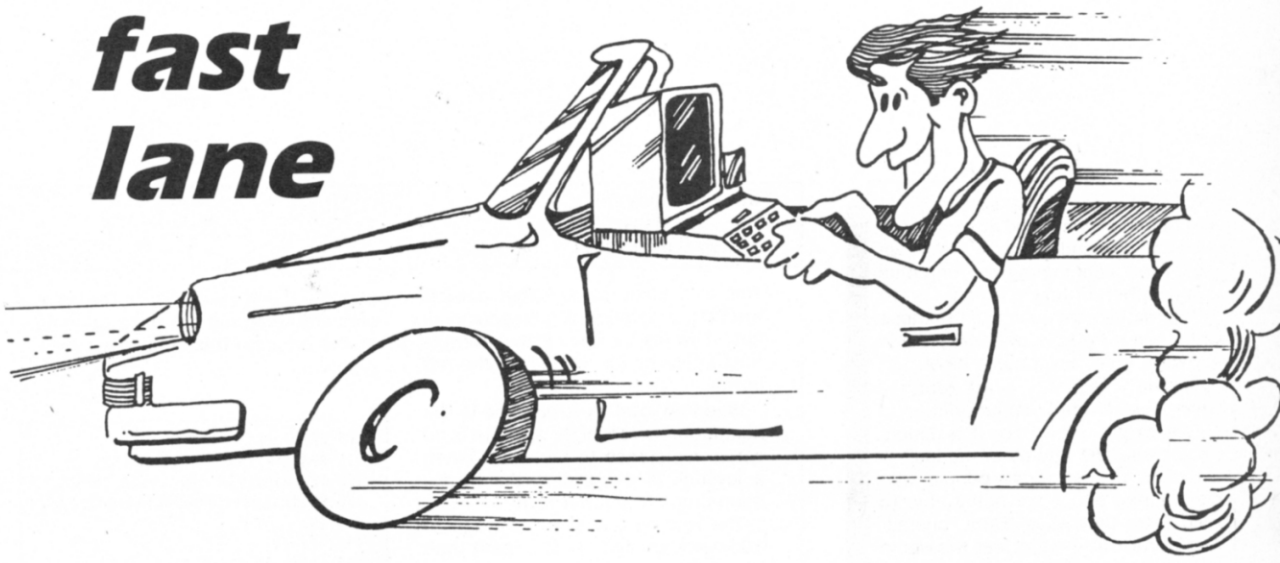
A063

Life in the fast lane



Barry Woods shows how to keep track of your motoring bills

THIS month's program is designed to help you keep track of your petrol consumption.

It lets you work out your current consumption in miles per gallon and compares it with previous values. The current and the last nine values calculated are displayed on an easy-to-read bar chart.

By keeping a check on the petrol used you can see whether the engine requires tuning – the petrol consumption will increase as the car approaches its next service.

If you tow a caravan regularly, this will also show up on the chart and you can easily see the effect of the extra weight.

Enter and run the program. You'll be asked if you wish to load the previous results. The first time you run the program the answer will be N for No.

Next you'll be asked if you wish to calculate your current petrol consumption. Press Y here.

Enter the number of miles covered at the first prompt and the amount of petrol used at the second.

Many petrol pumps deliver their petrol in litres and not gallons. If you tag an L on to the end of the number entered for the petrol it will be assumed to be litres and is converted to gallons before calculating and printing the mpg.

After displaying this a bar chart is drawn showing the current mpg first (on the left) followed by the previous nine.

Finally you have the opportunity to save the data to tape or disc.

```
   10 REM MPG Calculator
   20 REM By Barry Woods
   30 REM (c) Micro User
   40 MODE 1:DIM mpg(10)
   50 t$=CHR$(17)+CHR$(129)+"* Petrol Co
nsumption *"+CHR$(17)+CHR$(128)
   60 PRINT't$':COLOUR 2:REM Load mpg's
   70 PRINT"Load previous mpg's?";
   80 IF INSTR("Yy",GET$) ELSE 120
   90 file=OPENIN "MPGdata"
  100 FOR i=1 TO 10:INPUT #file,mpg(i)
  110 NEXT:CLOSE #file:CLS:PRINT't$'
  120 COLOUR 3:REM New mpg
  130 PRINT''"Calculate new MPG?";
  140 IF INSTR("Yy",GET$) ELSE 240
  150 FOR i=10 TO 2 STEP -1
  160 mpg(i)=mpg(i-1):NEXT
  170 INPUT''"How many miles";m
  180 INPUT"How much petrol";p$
  190 p=VAL p$
  200 IF (ASCRIGHT$(p$,1)OR32)=ASC"l" p=
p/4.5
  210 mpg(1)=INT(m/p):COLOUR 2
  220 PRINT"MPG = ";mpg(1):COLOUR 1
  230 PRINT"Hit a key...";:G%=GET
  240 CLS:COLOUR 2:REM Bar chart
  250 PRINT"MPG"TAB(10)t$
  260 y=12:VDU29,96;76;:FOR i=1 TO 10
  270 IF mpg(i) GCOL 1,1 ELSE 320
  280 MOVE 0,y*i*10:PLOT 21,1200,y*i*10
  290 MOVE 96*i,y*mpg(i):MOVE 96*i+64,y*
mpg(i):PLOT 85,96*i,4:PLOT 85,96*i+64,4
  300 GCOL 0,3
  310 MOVE 96*i,4:DRAW 96*i,y*mpg(i):DRA
W 96*i+64,y*mpg(i):DRAW 96*i+64,4
  320 VDU 5:MOVE -96,12+y*i*10:PRINT;i*1
0:VDU4
  330 PRINT TAB(3+i*3,31);i;:NEXT
  340 MOVE 0,900:DRAW 0,0:DRAW 1200,0
  350 G%=GET:CLS:REM Save mpg's
  360 PRINT"Save mpg's?";
  370 IF INSTR("Yy",GET$) ELSE 410
  380 file=OPENOUT "MPGdata"
  390 FOR i=1 TO 10:PRINT #file,mpg(i)
  400 NEXT:CLOSE #file:END
  410 MODE7:END
```

Get it right!

10 = 0 0	150 = 2A08 F	290 = 1D14 1
20 = 0 0	160 = 3EB0 D	300 = 41D9 B
30 = 0 0	170 = AA22 E	310 = BA20 B
40 = 5FDB B	180 = BBE7 1	320 = 48F4 6
50 = 770 F	190 = 6DBF 4	330 = 5B2B 0
60 = 1685 4	200 = 6CC7 6	340 = 8941 8
70 = C80C 6	210 = 9891 6	350 = 95A6 0
80 = 9723 7	220 = C8DB 1	360 = E041 1
90 = 269 F	230 = 7BC4 1	370 = 2223 E
100 = 3861 E	240 = DE2C 4	380 = A813 8
110 = 80FE B	250 = 546E 0	390 = 6E9C 5
120 = C04B 6	260 = 5094 1	400 = DBD8 C
130 = 343F A	270 = B37A C	410 = CDB0 3
140 = 984C 0	280 = D87E C	

THE MICRO USER

PROGRAM Library No.7

Compiled by Steve Turnbull

ANOTHER interesting selection of routines this month and do remember – when you send yours in – that we must have a demo program for it plus a description of how it works.

The routines we can't use are those which are for pieces of hardware and software which few people have.

We have a delay print routine, which does Mode 7 colour printing in single height – how about a double height version? And other modes?

By the by, for those people who complained about not being able to read Petra Galloways "Faint" characters Library No.4 – that was the whole point!

Send your routines – with full details of the language it is written in and the hardware/software requirements – on disc or tape to:

Steve Turnbull, Library, The Micro User, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.

Remember to enclose a stamped addressed envelope for the return of your media. Five blank discs will be sent to the authors of any routines published.

Name: Joystick Test
Language: Basic
Author: Daniel Tang

This is a Basic routine that detects whether a joystick is plugged in or not. It works by finding the average fluctuation of the values on the A/D port.

When no joystick is plugged in the fluctuation is very high, as there is no actual resistance to measure. When a joystick is plugged in the fluctuation drops to a lower level.

The routine takes the average of 100 samples and takes a short time to execute.

The only drawback is that the routine only works if the user isn't wobbling the joystick while the samples are being taken. But if the samples are taken right at the beginning of the program this should not be a problem.

```
100 REM Joystick Detector
110 REM ================
120 IF FNjoy t$=" not " ELSE t$=" "
130 PRINT"Joystick is"t$"plugged in."
140 END
150 DEF FNjoy
160 LOCAL A%,C%,L%,T%:L%=100
170 C%=ADVAL1+ADVAL2:FOR A%=1 TO L%
180 T%=T%+ABS(ADVAL1+ADVAL2-C%):NEXT
190 =(T%DIVL%)>362
```

Name: Delay Print
Language: Basic
Author: Jez Aston

The Delay Print routine was developed for slow readers, so they can follow words as they were printed up.

It works by taking a string argument and a Mode 7 number colour argument. The program extracts each word in turn and prints it up on the screen, if any word is too long to fit on the current line then a new line is started with the current colour code.

Each word is printed on the screen with a delay between each letter which can be altered by changing the parameter values for PROCw.

```
 100 REM Delayed Print Routine
 110 REM ====================
 120 MODE7
 130 PROCprint("Welcome to Jeremy Aston
's amazing print routine. It will delay
print any message AND format it on scree
n.",131)
 140 PRINT'
 150 PROCprint("You can print a message
 in any MODE 7 colour and it is very sim
ply transfered to other modes.",134)
 160 PRINT'
 170 PROCprint("The procedure could be
used in any program which requires the u
se of text messages. The delay segment c
an be taken out, or changed to speed thi
ngs up or down.",130)
 180 PRINT'
 190 PROCprint("The program was written
 on an Acorn Master, but will run on any
 Acorn machine - only the Electron needi
ng a few changes as Mode 7 is used.",132
)
 200 PRINT'
 210 PROCprint("Have a nice time using
it - Jez Aston.",133)
 220 PRINT':END
 230 DEF PROCprint(p$,C%)
 240 LOCAL K%,L%,P%,W%,r$,w$
 250 W%=39:VDU C%
 260 REPEAT K%=INSTR(p$," ")
 270 IF K%=0 K%=LEN p$
 280 w$=LEFT$(p$,K%):P%=POS
 290 p$=RIGHT$(p$,LENp$-K%)
 300 IF P%+K%>W% OR P%>W% PRINT:VDU C%:
P%=0
 310 FOR L%=1 TO LEN w$:PROCw(.1)
 320 VDUASCMID$(w$,L%):NEXT
 330 UNTIL p$="":ENDPROC
 340 DEF PROCw(t):t=TIME+t*100
 350 REPEAT UNTIL TIME>t:ENDPROC
```

Name: Print Using
Language: Basic
Author: P. Vincent

Peter Davy's wish for a FNusing can easily be granted by modifying his excellent PROCusing to return the number as a string using the STR$ function modified by @% – by setting byte 4 of @% to 1.

When a number overflows the specified field Basic reverts back to the G format. This can cause large numbers to take up more space than you expect, thus upsetting your layout. I have trapped this error and any numbers which are too large are simply replaced by the *image$*.

```
  100 REM FNusing Demonstration
  110 REM ====================
  120 MODE 3
  130 PRINTTAB(3)"X"TAB(8)"Y"TAB(12)"ABS
(X-Y)"TAB(22)"X/Y"TAB(32)"Y/X"TAB(41)"1/
X"TAB(51)"1/Y"TAB(58)"(X+Y)/ABS(X-Y)"
  140 FOR I%=1 TO 20
  150 REPEAT X%=RND(500)
  160 Y%=RND(500):UNTIL X%<>Y%
  170 IF RND(10)=1 X%=-X%
  180 IF RND(10)=1 Y%=-Y%
  190 PRINTTAB(1)FNusing("####",X%)TAB(6
)FNusing("####",Y%)TAB(14)FNusing("###",
ABS(X%-Y%))TAB(18)FNusing("####.####",X%
/Y%)TAB(28)FNusing("####.####",Y%/X%)TAB
(39)FNusing("##.####",1/X%)TAB(49)FNusin
g("##.####",1/Y%);
  200 PRINTTAB(60)FNusing("###.###",(X%+
Y%)/ABS(X%-Y%))
  210 NEXT:END
  220 DEF FNusing(image$,value)
  230 LOCAL @%,field,places,value$
  240 field=LEN image$
  250 places=INSTR(image$,".")
  260 IF places>0 places=field-places
  270 IF places>0 @%=&01020000+256*place
s+field ELSE @%=field:value=INT(value+.5
)
  280 value$=STR$ value
  290 IF LENvalue$<=field value$=STRING$
(field-LENvalue$," ")+value$ ELSE value$
=image$
  300 =value$
```

Title: Random Number Generator
Language: 6502 Machine Code
Author: Alastair Harwood

It can be quite difficult to get really random numbers in machine code. One way is to read the value of a continuously changing hardware memory location – but this suffers from incompatibility problems. However this short routine will produce random numbers easily and legally without any sequence repetition.

It uses the system TIME variable available on all versions of the BBC Micro through the osword 3 command. It then encodes this value to produce a random number.

In this implementation of the technique a three digit number is printed on the screen each time you press Space, in your own programs you only need extract the relevant portions of code.

```
100REM   Random Number Generator
110REM   ------------------------
120DIM code 256
130PROCassem
140PRINT"Press space for number"
150REPEAT REPEAT UNTIL GET=32
160CALL random:UNTIL FALSE:END
170DEF PROCassem:osnewl=&FFE7
180oswrch=&FFEE:osword=&FFF1
190FOR L%=0 TO 2 STEP 2
200P%=code:[OPT L%
210.random
220LDA #ASC"0":STA num
230STA num+1:STA num+2
240LDX #clock MOD 256
250LDY #clock DIV 256
260LDA #1:JSR osword
270.loop1
280LDA clock:SEC
290SBC #100:BCC loop2
300STA clock:INC num+2
310JMP loop1
320.loop2
330LDA clock:SEC
340SBC #10:BCC loop3
350STA clock:INC num+1
360JMP loop2
370.loop3
380LDA clock:SEC
390SBC #1:BCC jump
400STA clock:INC num
410JMP loop3
420.jump
430LDA num+2:CMP #ASC"9"
440BEQ next1:BCS rset1
450.next1
460STA num+2
470LDA num+1:CMP #ASC"9"
480BEQ next2:BCS rset2
490.next2
500STA num+1
510LDA num:JSR oswrch
520LDA num+1:JSR oswrch
530LDA num+2:JSR oswrch
540JMP osnewl
550.rset1
560SEC:SBC #10:INC num+1
570CMP #ASC"9"+1
580BCS rset1:BCC next1
590.rset2
600SEC:SBC #10:INC num
610CMP #ASC"9"+1
620BCS rset2:BCC next2
630.clock
640OPT FNequd(0):OPT FNequb(0)
650.num OPT FNequs("000")
660]:NEXT:ENDPROC
670DEFFNequb(E%):?P%=E%:P%=P%+1:=L%
680DEFFNequd(E%):!P%=E%:P%=P%+4:=L%
690DEFFNequs(E$):$P%=E$
700P%=P%+LEN
```

Name: Feint & Mode 7 Zap
Language: Basic
Author: Iain Coulthard

First a quickie – in Petra Galloways Faint program the following changes will produce Feint characters: Delete lines 590-640, 730, 740 and 840 to 860, change line 570:

```
  570  LDX #1
```

And finally add these lines:

```
  590  LDA charbuf,X
  600  ASL A
  610  AND charbuf,X
```

The following routine produces the screen zoom in and out effect found on many games. It takes one parameter which controls the corner which the screen is zapped to or from – zero is top left, one is top right, two is bottom left and three is bottom right.

It works by programming the 6845 CRTC chip to change the screen size – the current values are for Mode 7, but they could be easily be changed for other modes.

If you use this routine you will need to set the variable *zap* to FALSE at the program start and any time you change the screen mode. Whenever PROCzap is called the variable *zap* is swapped to indicate whether the screen is zapped or normal.

```
  100 REM Screen Zap
  110 REM ==========
  120 PRINTTAB(10,10)"Screen Zap!"
  130 zap=FALSE:REPEAT PROCwt(.5)
  140 PROCzap(RND(4)-1):UNTIL FALSE
  150 DEF PROCzap(C%):LOCAL X%,Z%
  160 IF NOT(C%AND1) VDU23;2,51;0;0;0;
  170 IF NOT(C%AND2) VDU23;7,27;0;0;0;
  180 Z%=ABS(zap):FOR X%=40*Z% TO 40-40*
Z% STEP 1-2*Z%:*FX19
  190 VDU23;1,X%;0;0;0;:IFC%AND1VDU23;2,
X%+11;0;0;0;
  200 VDU23;6,X%/2+5;0;0;0;:IFC%AND2VDU2
3;7,X%/2+7;0;0;0;
  210 NEXT:zap=NOTzap:ENDPROC
  220 DEF PROCwt(t):t=TIME+t*100
  230 REPEAT UNTIL TIME>t:ENDPROC
```

MORLEY ELECTRONICS

TELETEXT ADAPTER

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The MORLEY TELETEXT ADAPTER introduces you to the world of Teletext at a price that won't break the bank. Inside it you will find the latest in second generation Teletext chip technology, which unlike our rivals who are still using chips designed more than ten years ago, will be fully compatible with any future advances in the Teletext system.
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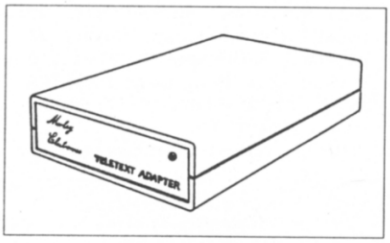
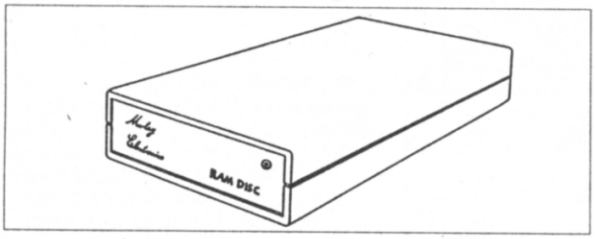
* Supplied with 16k ATS (Advanced Teletext Software) and 16k support ROM software inc. printer dumps, page spoolers etc.
* FREE Telesoftware, no access charges (updated weekly).
* Save selected pages to disc/tape for later retrieval.
* Full access to all Teletext services and channels e.g.: CEEFAX, ORACLE, 4-TEL.
* Gives you a real-time clock at your disposal (*TIME).
* Software upgrades to allow for any enhancements to the Teletext service, e.g.: extra channels, full field data on cable & satellite systems etc. (only the media charge).
* Easy to follow comprehensive user guides.
* No hardware limitations, it can for example receive virtually unlimited numbers of channels.
* Utils disc available including printer drivers allows pages to be selected and dumped direct to a printer (no more TV or Radio Times to buy).

WHAT THE REVIEWERS SAID:

". . .In terms of price, performance, future expansion possibilities and those little touches that show thought for the end user I would recommend the Morley unit."–*(Acorn User, January, 1986).*
". . .The Morley unit has been designed to ensure that its operation is simple and smooth. It is the ideal Teletext adapter for school use."–*(A&B Computing, June, 1986).*
". . .Using it over a number of months in different schools, it has proved utterly reliable, and may confidently be recommended."–*(The Times Educational Supplement, September, 1986).*



THIS IS THE BIGGEST SELLING TELETEXT ADAPTER CURRENTLY IN PRODUCTION WORLDWIDE, AND COMES WITH A FULL MONEY BACK SATISFACTION GUARANTEE.



RAMDISC

Now available! The first true MEGA capacity RAMdisc for the BBC, BBC B+ and MASTER computers.
This fully compatible unit, currently available in either 1 or 2 megabyte versions comes complete with operating software on ROM, power supply, battery backup and a comprehensive user guide.

FEATURES:
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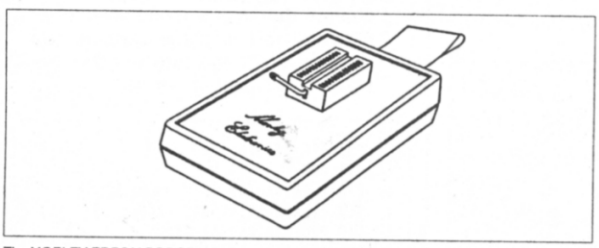
Well that's the spec., add to this our usual 12 month no quibble guarantee and we're sure you'll agree the Morley RAMdisc is the sensible alternative if increased storage capacity and speed is your requirement.



The MORLEY EPROM PROGRAMMER V2 is a small self contained unit that plugs into the BBC or MASTER user port. It comes with a high quality ZIF (zero insertion force socket) and contrasting plastic case. Also included in the package is it's own user friendly menu driven software on ROM or disc.
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Your technical questions answered by MIKE COOK

PROBLEM SOLVED

Drumming man

I AM interested in music and the Music 500 has caught my eye. I have heard it is very good but there are no drums or rhythm. I want proper sounding drum beats. Is there any hardware that can do this. – **Stuart White, Blackpool, Lancs.**

● *The Music 500 is an excellent piece of equipment. The waveforms it produces can be tailored to get a quite acceptable drum sound. It's difficult to know what you mean by "proper sounding drum" but I have been quite impressed by the music produced by the system. Dedicated drum synthesizers can be connected to the BBC Micro through a Midi interface, but this is a much more expensive proposition.*

All right

I HAVE a BBC model A upgraded to a B. It has been fitted with a DFS, a teletext adapter and most recently a rom board. I now get black bands running up and down the screen. Using a hairdrier to cool the system it works except when the disc drive operates.

Acorn say that an upgraded power supply should have been included with the disc interface when it was fitted by Viglen.

Viglen says that it is not paid by Acorn to supply or fit a new power supply when upgrading for a disc drive.

Watford Electronics (who fitted the board) says that it should work without problems using the old power supply.

Who's right? And is it worth making a claim for the goods not doing what they should do? – **David Fuller, Crawley, West Sussex.**

● *Acorn is correct – a BBC Micro can work off the old power supply. But it does not have the reserve to power anything extra. The extra load put on by the rom board causes increase power supply ripple and this you see as dark bands across the screen. When Acorn first offered disc upgrades the original supply was supposed to be replaced.*

Viglen is correct – the Acorn disc upgrades were quite expensive because of this extra supply that was needed. Hence other people supplied cheaper upgrades. They could do this because they were not required to change the power supply.

Watford is correct – The rom board can be used with the old power supplies. However you have both the old supply and a disc interface which coupled with the rom board is just too much.

Although you feel you have been short changed, legally you do not have a leg to stand on. The sale of goods act states that goods have to be fit for the purpose they were sold for.

You bought a Model A BBC micro and that's what you got. Replacement power supplies cost about £60 and would in all probability solve your problem.

Loading problem

I BOUGHT a Watford Solderless Rom Socket Board. This worked until I bought two 6264 ram chips which fit into sockets 14L and H.

When I tried to *LOAD into sideways ram and then examined the contents of &8000-9FFF the contents of the DFS rom are displayed.

I have tried to load Basic and machine code programs and also rom images, but the DFS rom is still displayed. I have also tried moving the DFS rom but this did not work either. Can you help me. – **David McCartney, Swaffham, Norfolk.**

● *When you examine memory locations above &8000 you will see the currently selected rom which will be Basic or the DFS. One way of looking at the sideways ram is to place its address, in this case 14 into the select latch at &FE30 and then look at the addresses.*

However you can't do this using Basic itself as you will have to page out the Basic rom – so it must be done in machine code.

*After loading a rom image into sideways ram pressing the Break key will initialise the software and it should show up with a *HELP command.*

*You can't use sideways ram for Basic programs using just *LOAD. You can only use it for machine code programs if you switch the ram in. Make sure that whatever you place in memory location &FE30 is also in location &F4 so the operating system knows what rom socket is enabled.*

At the end of your machine code program you should switch the rom back to the appropriate language again or the machine will hang up.

Interference

CAN you suggest a way of reducing or eliminating the radio interference from my BBC Micro.

I like to listen to the radio while I am using my micro and the interference can be bad enough to swamp the radio programmes when the signal strength is low. The interference is on all bands but can be reduced by changing the position of the telescopic aerial on the set. – **A.J.S. McMillan, Keynsham, Bristol.**

● *Radio interference from computers can be a problem. All those signals rising and falling so rapidly contain very many harmonics and as you have found they cover all bands.*

In this country there is no recommended limit for spurious emission from computers. The best solution would be to fit a properly screened outside aerial.

There are other ways you could try screening the computer like coating the lid with foil but most of these methods prove unsatisfactory.

By far the bulk of the interference comes from the monitor as there are much larger signals switched there than in the computer. Try working your radio next to your TV and you will see what I mean. In short, despite the title of this page there are no easy solutions to this problem.

Roms and eproms

I AM writing some rom software for my model B. However, the code length has now exceeded the allocated 16k. Since my eprom programmer allows me to program 27512 (32k) eproms, there must be a way of using these in the BBC. I would be grateful for any suggestions

Thanks for an excellent magazine. Keep up the good work. – **Ian Duplock, Sittingbourne, Kent.**

● *You can use a 32k eprom in the B+ and Master directly but the software sees it as two 16k roms – this means you'll have to have some communication protocol between the two.*

If you want to use them in the Model B you will have to make up a board to allow the one chip to look like two sideways roms. This can be done in many different ways. One is to get another output line from somewhere like the user port or rom address switch in latch and use that to switch the extra address line. In both cases the 32k of memory space will be divided into two 16k spaces and again your code must be written to switch between the two.

FRED failure

CAN you tell me why the memory given over to FRED (&FC00-&FCFF) which is accessible from the 1MHz bus port is continually written to with &FF. I found this when I built a simple address decoder to run off this port so that I could expand the system.

I have made link 17 on the main circuit board to enable FRED. Is there

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◀ *From Page 57*

any way to stop the continual writing to FRED? – **Richard Willmot, Brentwood, Essex.**

● *The BBC Micro does not continually write to FRED so it must be a fault in your interface circuit. By the way, the Advanced User Guide says you have to make link 17 to enable output to FRED. This is not the case so try removing it.*

Computer talk-in

WHY hasn't somebody invented a way for messages to be transmitted from micro to micro via radio waves? Or if someone has actually done this could you tell us how? – **Simon Cope and Ben Burt, Codnor, Derbyshire.**

● *Computers have been talking to each other over the air waves ever since they were created. However the only way the likes of you and I can do this is to get an amateur radio licence.*

The terms of a CB licence do not allow you to transmit anything but voice. To get the licence you need you must pay an annual fee of about £12 and also pass the City and Guilds radio amateurs exam. This is a quite simple exam of about O'level standard.

Once licenced you can transmit data as RTTY which stands for radio teletype. This uses the same sort of codes used in telex machines and is widely used by amateurs.

Alternatively you can transmit the data through the cassette tape system using audio tones. If you do this you must make sure that you add some additional filtering to the signal to take out spurious high frequency signals caused by edges.

For further information you can contact the RSGB (Radio Society for Great Britain), Potters Bar, London.

Video synch

I AM interested in home video and although I can get titles produced by my micro or pictures, I can't get both on-screen at the same time.

Can you tell me what hardware and software I will need to achieve this – and how much will I have to spend? – **S.P.S. Dillon, West Bromwich, West Midlands.**

● *Synchronising and mixing two separate video signals requires a very sophisticated piece of hardware called a genlock – the cheapest costs more than £200.*

To mix the signals, their vertical and horizontal synchronisation pulses must match: The genlock device holds back a complete frame of one signal until it synchronises with the second, then mixes them.

Split picture

I HAVE a Hitachi 14in colour monitor, model CD 1453D, which I bought from Matmos over a year ago.

I have been trying to use this with a model B. I have buffered the H.sync and V.sync and connected RGB but there seems to be some difference in the interfacing or scan, the picture is split vertically every other line. Is there an interface I can obtain for this or can you suggest something to help me? – **L.K. Cullen, Haverfordwest.**

● *The fault rung a bell with me, it looked like something I saw many years ago when viewing a 405 line TV signal on a 625 line monitor. A quick phone call to Hitachi confirmed my suspicion that the CD1453D monitor does not use a standard line frequency.*

The domestic TV system and most computers run at a 15kHz line rate, this monitor runs at 24kHz line rate so you are getting one and a half lines on the monitor for every single line the computer outputs. Unfortunately there is no

Your technical questions answered by MIKE COOK

PROBLEM SOLVED

simple way to convert the monitor to operate on the standard line rate.

Buffer problems

I AM building a bidirectional buffer to my micro's user port and I want to be able to sense whether all the bits of the port are selected for input or output. I think pin 23 of the VIA has something to do with the register FE60 and could be used for this purpose, could you explain? – **C.A. deCosson, Alresford, Hampshire.**

● *Pin 23 of the VIA is a chip select pin and is nothing to do with what you want. In fact there is no simple way of telling if a user port line has been programmed to be an input or output.*

But why do you want a bi-directional buffer anyway? The only reason would be to protect the VIA from damage and as VIA's are so cheap it would probably cost as much as the buffer to replace.

Sticking point

MY AMX mouse will not move the pointer on the screen to the right. The other directions are okay, but when I try to move the pointer to the right with the mouse it goes to the left. All is well when using the cursor keys or the joystick, and the buttons on the mouse seem to work.

I have tried the mouse on another BBC Micro it worked perfectly, so the problem clearly lies with my computer. I use the user port quite satisfactorily with a Morley teletext adapter and an amateur radio RTTY terminal unit. I have interchanged the 6522 VIA IC's to no avail. – **B.D. Hedgecock, Basingstoke, Hants.**

● *Your problem is that the horizontal direction signal from your mouse is not getting through to bit 0 on your user port. It is possible that your computer is faulty and the other devices that work off the user port do not use that bit.*

Movement to the left is indicated when a logic one is on bit 0 and this will occur permanently if there is no connection being made. You could have a faulty user port plug or a cracked track from the plug to the VIA.

On the ball

I DECIDED to build the interface for the Atari Trak-ball from the January 1985 issue of *The Micro User*. Unfortunately the interface fails to work properly, could you please give me any information on this article published in your magazine because several diagram labels seem to be incorrectly positioned. – **P. Davis, Chesham, Bucks.**

● *There are no errors in this article and no labels are used incorrectly. Have you corrected yourself into a mistake? Incidentally the printed circuit board to make this interface is still available from Musbury Consultants. Price £3.50 inc P&P.*

Pulse rate

HAVE you published any articles in *The Micro User* on building an instrument for measuring the pulse rate and displaying it on screen. – **K.A. Kerley, Sittingbourne, Kent.**

● *The issue you are looking for is April 1984. Kits are available at £19.00 for the kit and £25.50 ready asembled from Musbury Consultants.*

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REVIEW

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On call...

Paul Lewis puts the Dialcom comms package to the test

THERE are hundreds of computers in the UK and thousands around the world which you can contact with your micro by plugging it into the telephone network.

These computers offer information, news, electronic mail services, and software to download. To get access to them you need a modem to enable the digital information used by your computer to be translated into signals that our primitive telephone network can transmit

The software which interprets the incoming data writes it to the screen, translates your keyboard input and transmits it out of your computer to the distant one.

Dialup is one such software package from PMS Communications. It is only available by mail order and costs £92.90 including p&p. For that you get a slip case and binder containing the 160 page manual, a function key strip, the software on a disc, and a document called a 'licence agreement'.

This tells you that "Dialup [for which you have just paid nearly £93] is the property of PMS", that you cannot do anything with it except use it yourself and you must not copy the program, except to make a security backup.

You also get a special cable to connect your modem to your micro in the middle of which is a circuit in a small box which Dialup looks for every time it is used. If the circuit is not present, then Dialup will not work.

Such hardware based protection devices are called 'dongles'. They are expensive (you pay for it) but certainly stop people giving copies to their friends. Remarkably, the special cable does not seem to interfere with other communications software.

*DIALUP takes you to the main menu called the Service Directory. At the bottom of the blue screen, there is a menu of five choices in a horizontal yellow box – CONNECT, AMEND, CREATE, UTILITY, EXIT.

CONNECT is highlighted. Pressing the spacebar moves the highlight along the menu. Pressing Return selects the highlighted menu choice, see Figure I.

Product: Dial up
Price: £92.90
Supplier: PMS Communications, Norfolk House, Smallbrook, Queensway, Birmingham B5 4LJ.
Tel: 021-643 7688

The first three choices are concerned with the directory in which Dialup stores the details of up to 50 different online services. The directory contains the telephone number, the technical details of the service, and your own identification to allow access to the service.

Dialup comes equipped with half a dozen services in its directory. You may find however that the telephone numbers contain unnecessary area codes and you will want to add your own identification or password.

AMEND lets you alter (or delete) existing entries – CREATE lets you add your own. The name of the service to alter is selected from a vertical list in the middle of the screen by moving the highlight down the list with the spacebar and pressing Return selects the highlighted entry.

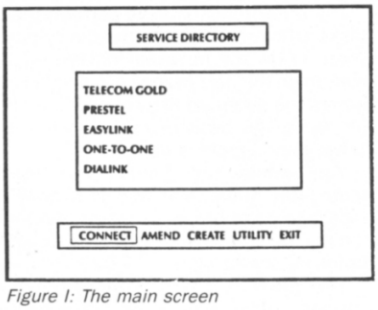

Figure I: The main screen

Another horizontal menu offers you EDIT, SAVE, DELETE, EXIT. EDIT is highlighted, and pressing Return produces the "service definition" screen which enables you to alter the seven key pieces of information for the service, shown in Figure II.

Service name stores up to a 30 character name for the service.

Telephone number stores up to 14 digits and spaces. Each space introduces a one second delay, useful if you have to dial out through a PBX switchboard.

Speed sets the baud rate of the service. That is the rate at which the data is transmitted to and from your computer. The choice is via a sub-menu which offers all the currently used standards.

Format sets the length of each chunk of data and the error checking test used. The choice is from a sub menu. In addition to the standard formats, it also offers the new EPAD protocol which gives access to a service from British Telecom for error free data transmission.

Emulation lets you choose between the viewdata type of service such as Prestel, and services offered by Telecom Gold/MicroLink and bulletin boards, which present alphanumeric information on a scrolling screen. Three other emulations are available, including Dialup's own.

Protocol sets the rules which the computer will use in transferring files between your computer and the distant computer. The three standard protocols, CET, XMODEM and KERMIT, are all offered as well as Dialup's own.

Finally, Logon sequence enables you to store details of your own identification and password to get access to the service in your name. PMS specifically recommend you not to store your password. If you do then anyone loading your Dialup could gain access to a service at your expense.

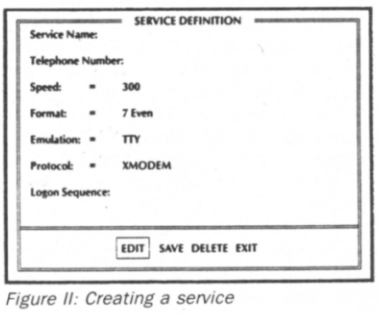

Figure II: Creating a service

You can store up to 30 characters in the logon sequence, including pauses, Return and an instruction to await a keyboard entry. I would prefer to programme a series of function keys with the separate components of the entries needed and press them in turn as the computer asks for the next item.

Unfortunately, Dialup does not let you

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◀ *From Page 61*

program the function keys. So if the logon sequence fails you must enter the lengthy codes manually.

Once you have amended the service details to include the correct telephone number and your logon sequence, you move the horizontal menu highlight to SAVE them to disc. Alternatively, you can EXIT without saving or DELETE the whole record permanently.

To log on to a service select CONNECT from the opening menu. The highlight moves to the vertical list of stored services. Move the highlight to the service you want and press Return. What happens next depends on your modem.

Modern modems can dial the telephone number themselves. Others have to be used in conjunction with a telephone on which you manually dial the number and replace the receiver when the call is connected.

Dialup works with these manual modems and prompts you with the baud rate to set your modem and the number to dial. But to make full use of it you need one of the six autodial modems which Dialup supports. These are the Miracle WS4000, WS3000 and Schools Modem, the DaCom Communitel or TM512, and the Tandata TP512.

Dialup may not work with autodial modems not on the list, especially if they are not Hayes standard, as there seems to be no way of communicating with the modem from the keyboard.

With the autodial modems it supports, the sequence: *DIALUP, RETURN, CURSOR DOWN, RETURN magically connects you to any service in the directory.

The features on Dialup for Prestel users are limited. Nine of the function keys are used to implement the features shown in Table I, other packages use up to 20.

Save frame f3 prompts for a name of up to eight characters. Up to 30 frames can be saved but not as normal files. You can only access them through Dialup using the UTILITIES option. From the UTILITIES menu, FRAME MANAGEMENT gives you access to the frames saved by f3.

You are offered a list of all the names

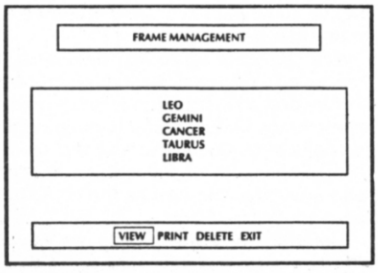

Figure III: Viewdata frame management

f0	Transmit break. Seldom used but necessary when needed
f1	Hold on/off. Halts the information coming to the screen
f2	Echo to printer. Sends the incoming text to the printer
f3	Echo to file. Saves the incoming text to disc file
f4	Echo from file. Allows you to send prepared files as electronic mail
f5	File transfer - to or from another computer
f6	Utilities accesses disc directory and stored frames
f7	Clear screen
f8	Reset clock
f9	Exit terminal, after logging off, to return to Dialup

Table I: Function key effects for Prestel

f0	No effect
f1	changes the Return key to be Return from its default £
f2	Print frame, centered with a nice border and £ for graphics
f3	Save frame
f4	Load frame previously saved
f5	Download file using the standard CET protocol
f6	Utilities: access to disc directory and stored frames
f7	Clear screen
f8	Reset clock to 00.00.
f9	Exit viewdata, after logging off, to return to Dialup.

Table II: Function keys effects in Terminal mode

of frames saved, with the first five of a possible 30 listed in a vertical window. You must decide whether you want to VIEW, PRINT or DELETE a frame by highlighting the horizontal menu at the foot of the screen, see Figure III. Select VIEW and you must then choose the name of the frame by moving the highlight down the list of frames.

Pressing Return loads the highlighted frame on to the screen. Any key then clears the screen back to the VIEW option with the highlight on the FIRST name on the list. So to look through all 30 frames means cycling the highlight through all the names each time.

Other software offers a carousel of screens, loaded for viewing one after the other which is much more convenient. The PRINT function works the same way.

The other function keys perform their tasks efficiently. But oh, the omissions! There is no key to reveal hidden information on the quiz frames. No single key enters the standard Prestel codes of *# or *00 to go back or repeat a frame. There is no graphics dump.

You cannot 'tag' frames and recall them later. There is no facility to send a message page prepared offline. And no facility to create viewdata pages with graphics and colours.

The other major use of communications software is to send electronic mail via Telecom Gold or a similar service. The facilities of Dialup are better here but still limited.

Information provided by these services is simple alphanumeric text. So you should be able to choose the screen mode and colour. Unfortunately, Dialup gives you no choice. You get black print on a green background in Mode 0. Ten function keys are used to give a range of features in terminal mode. These are given in Table II.

Information coming in from Telecom Gold or Bulletin Boards arrives at the bottom of the screen and scrolls up faster than it can be read and remembered.

It can be saved in the computer's ram, in a disc file, or printed on paper. Dialup is loaded into ram from disc, so there is not enough room left to store data. That leaves disc or printer, both of which Dialup supports very well. As an alternative, f1 stops the information scrolling off the screen until you have read it.

The UTILITIES menu of Dialup is accessed from the main menu. FILE enables you to catalogue, rename or delete a file from disc. But there is no other access to the BBC's operating system * commands.

PRINTER allows you to filter form feeds and switch line feeds on and off. But you cannot send any other codes to the printer to set the page length or change typeface, for example. MODEM allows the selection of manual modem or one of the six autodial modems which Dialup supports.

Most communications software for the BBC Micro retails at £30-£40. So a program costing over £90 should do everything all the others do and more.

Dialup doesn't. It is a business orientated program which, when set up correctly with one of the supported autodial modems, will link you rapidly and efficiently to an electronic mail service such as Telecom Gold or a viewdata service like Prestel.

It supports some useful protocols for error-free transmission of large amounts of data. But its other features are limited, especially on Prestel. Worst of all, you cannot access the operating system or program the function keys.

PMS say that registered users will be offered free updates of the disc. Dialup comes with an excellent manual with as clear a guide to the basics of computer communications as I have seen.

The support I got from PMS as a customer was good. But Dialup is a business price for limited business use. Unless you are into sending large quantities of machine code or numerical data through telephone wires, you could spend your £92.90 on two programs with more facilities and still afford a book on communications. ■

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Adventuring among the dreaming spires

SELF-IMPOSED rules are made to be broken: At least, that is what I persuade myself.

Normally I have delved a considerable way into an adventure before reviewing it for this column. If you consider a score of six (maximum possible 100) as evidence of considerable delving, then my rule is still intact.

The game in question is Oxbridge, written by Colin Jack (of Programmers Revenge notoriety) and is fully illustrated in Mode 7. It is marketed by Tynesoft, and is available on tape or disc.

The title suggests the theme: Entering Oxbridge as a Freshman, your task is to learn how to survive in the university environment, collect treasures and solve some fascinating puzzles.

The normal facilities for an adventure such as save game are available though the parser is fussy in one sense: Apart from directions, input has to be entered by spelling out the object to be manipulated in full so LADDER cannot be shortened to LADD.

I was impressed by the Mode 7 graphics used which included views reminiscent of Tom Quad, solemn cloisters, manicured lawns and all the other scenes you'd find in the home of dreaming spires.

Some entertaining characters are encountered: Dr. Spooner is still hankering after his kinky gorilla, and a bunch of French tourists have a devastating line in puns.

The puzzles I have solved are logical as well as entertaining, and the back of the cassette inlay provides a hint sheet.

This excellent game deserves a wide market and will keep adventurers happy for several weeks. It is a Division One offering, and rates four stars.

Still on the theme of new releases, Robico should by now have a revised version of Village of Lost Souls available – renamed Realm of Chaos. And Blazing Star (their newest game), should be available soon.

A great deal of this month's column has been written using a Master 128 loaned to me by Microtest while they fix my BBC B. Inevitably, I've had to try Elite on it with my 6502 Second Processor running.

The speed of the game with that hardware configuration is staggering. I tried blasting a shuttle for fun to see how the police reacted and they were like a crowd of angry hornets: I survived four attack waves, and then it was curtains.

Trevor Green has a problem with Elite: He's just started the first mission. You should look at the "Data on System" screen each time you land and you'll get messages as to the rogue ship's whereabouts. Eventually you have to use Galactic Hyperspace before it is cornered.

The second mission involves taking a message across a galaxy, with Thargoids assuming a certain amount of nuisance value while giving you the chance to collect alien items. At the end of the mission you are rewarded with a naval energy unit.

David Doran writes to say that, once you have completed the first mission, if you start the Galactic Hyperspace countdown and then keep pressing Control + Escape, you are eventually greeted with the incoming message that starts you on the second mission.

I preferred doing it the hard way.

I hope no one held their breath on reading my promise of a detailed study of Level 9's Emerald Isle. It was nearly a year ago, but space has only just permitted the project to appear in print.

Apart from mapping the adventure in the usual way, I found it useful to give myself instructions. This helped me approach the final solution to the adventure methodically.

I added to the instructions as exploration progressed, and once I was sure that I knew everything I ought to do, I went back to a saved position at the beginning of the sequence and worked my way steadily through the actions, then saved again at the end of the section.

My method involved dividing the game into task modules with each one ending at a central location. All the items I collected were stored there until it was time to take the treasure to the palace.

The location I found most useful was the middle of the beach. It allows a short cut towards the end of the game.

I'm not saying this is the quickest way of solving the adventure, but you can achieve maximum points by following the method I outline.

I won't give detailed instructions for everything; you have the task of exploring and mapping, but adventurers stuck anywhere in Emerald Isle will be able to finish successfully if they do as I set out below.

Module 1: You start off dangling from a parachute tangled in forest trees. Release the parachute, and then go back up and collect it. Move down and then E into the city, collecting the silver coin on the way.

Once in the city, go N to the north bridge, take the glue pot and wear the robe. Then go E to the plaza, up the clock tower and take the manual.

Enter the palace, visit the hanging gardens and then go to the dress circle and give the seamstress the parachute in order to receive the bronze coin.

Go to the copper room and get the copper coin; then enter the throne room so that the king tosses you the gold coin.

Go to the station and buy a season ticket with the silver coin. Note that you can usually move in the dark in this adventure without getting killed; so when you move to the tree stairs and the report comes "It's dark", just be brave and move on down onto the platform.

Module 2: Wait for a train, and then travel to the seaside station. Visit the signal box for the pliers and then the sand dunes for the log and leave them both at the middle of the beach.

Get the anchor and leave it by the log, then throw the glue pot at the threads near the rugged rocks to remove the spider.

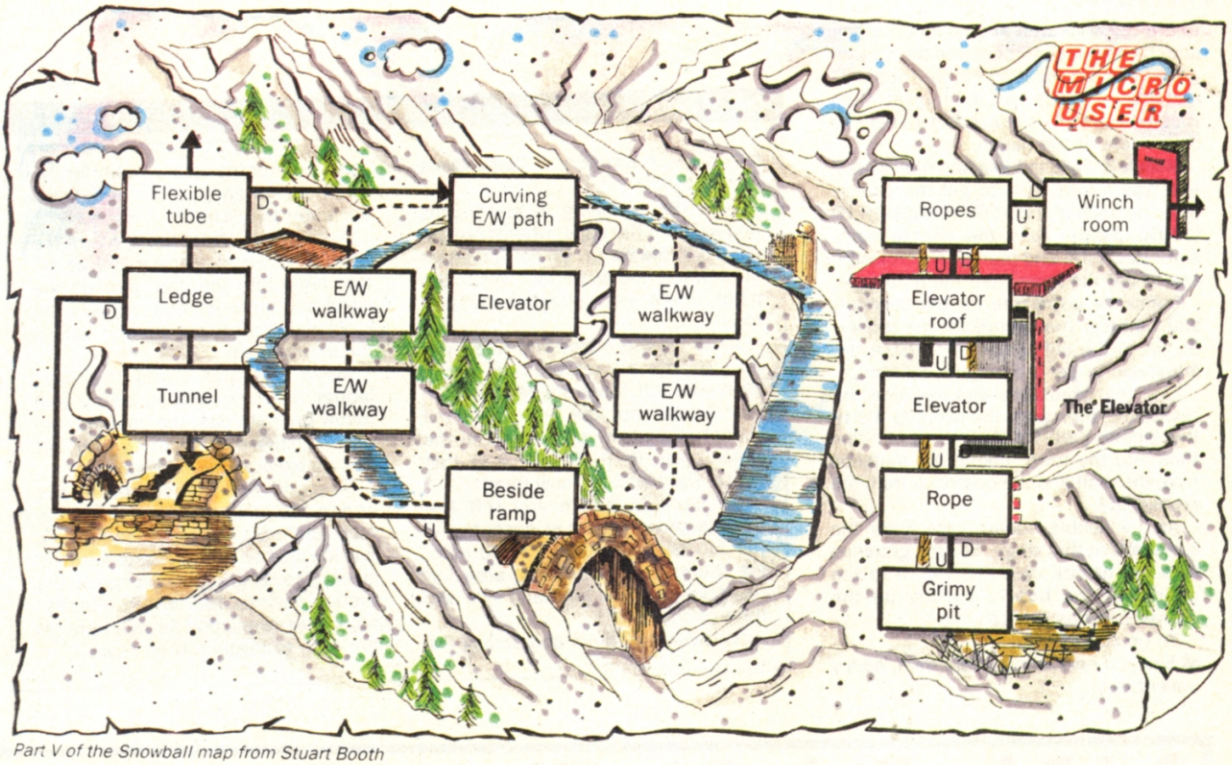
Go W, S and W through the dark cave

Turn to Page 66 ►

Problem Corner

How can the Hoy brothers get the Thing out of the tar pit after smashing the machinery in **Fantastic Four by Questprobe?**

Jeremy Douglas of Bangor has **Lord of the Rings** problems: He can't save his collected items at the end of each part – so he's had to do three of them independently. Do any other readers have this trouble? How can it be cured?



Part V of the Snowball map from Stuart Booth

Helpline

S. Kirk-Jackson of Sheffield offers some **Dodgy Geezers** tips: The garage has wire cutters to help you into the wreckers yard. Mr. Video is in the arcade, Tweedle at the racetrack, Cracker in the sauna and George will give you Little Ken's number.

He urges us to avoid Gucci shoes – quite right. After all, Lobb's is the place to find an honest English boot.

He is also stuck in **Bored of the Rings** – a brilliant spoof. When you hear the sound of hooves, hide and then go N to the Triffid Farm. After meeting the barrow wight, ask for a clue then go W, W, N to rejoin the Great East Road.

Dominic and Nicholas Hoy are stuck in **Lords of Time**. Give the narcissus the looking glass to get the lodestone then wave it at the shed to get the keys.

To get a long lasting source of light go to the compost heap. Examine it once to see a coin (leave it there for the time being) and again for the mushroom ring. Eat it and then give the tooth fairy the tiger tooth from the ice age but refuse the first offer the tooth fairy makes.

They can help J. Hemmings in **Old Father Time**. Go to the magical peel room, rub the lamp, pay genie and go to the room with the dwarf. Smash mirror, jump down the shaft, go S to find a sword then N,NE to Medusa, slay Medusa and slay snakes.

However, they are stuck in the marble room – suggestions, please.

In **Dungeon Adventure** they can't pass the goat. They need the cracked pot from the filthy dead end cell area. Fill it with slime from the bottom of the ramp and drop the slime filled pot by the goat which will slip to its death.

Mike Ralph can't get the taxi in **Terrormolinos**. The answer involves getting everything ready for going abroad.

You need the camera, the trunks, the passport, bucket and spade. In the bedroom examine it for the brochure and tickets, examine the drawer and open it for the red hanky.

Finally, call Doreen in the hallway. Wait until the taxi hoots and go out quickly and hire it: Off you go for the holiday of a lifetime.

Paul Livesey says there's a mistake in the **Wizadore** pokes given in the May issue: Try substituting the figure 7 for 9 and vice versa – and you then must CALL the program execution address.

D. Archer wants to know how to cross the desert in **Sphinx Adventure:** Go N,E,N,S,E,W,E,S,N,S,E,W,E,S,N,S,E,W,E,S,N.

Help for Rebecca Wombwell's **Countdown to Doom** problem was offered by two readers: Andrew Hughes and Barbara Gibb. It is fatal to go too far down the volcano – the correct route is up from the steep rocky hole. SAY FLEZZ will disable the robot in the dome.

Richard Sams can't enter Bree in **Lord of the Rings:** The trick is to knock at the gate, and then give the name "Underhill" when asked who you are.

Paul Hunt is having problems in **Hampstead:** Wear the tweed suit that is in the Oxfam shop, and search the newsagent's for the magazine. As long as you have the bracket from the industrial estate and the credit card, you are ready for life in the City.

Kamlesh Parmar offers help with **Ravenskull** for N. Gregory. The top gate is opened by the green key near the ravenbee.

Move up from the top gate to find the magenta key for the bottom gate, beyond which is a scroll. Read the scroll to open the gate on the right.

◀ *From Page 64*

to the volcanic area and collect the pan and the necklace. Proceed to the stream gravel via the location "more foothills" and pan for gold to get the nugget, then visit the copse for the axe and go back to the middle of the beach.

Module 3: Take the axe and the manual and type CARVE LOG to get the canoe; take the anchor and ATTACH ANCHOR TO CANOE (vital). Take the bronze coin, enter IN CANOE and then go N across the sea to get the lamp from the north isle.

Climb the palm tree for the coconut, and visit the shady cove for the ladder. Go up to the cliff grass and attack the telescope to get the magnifying lens.

Find the deadlands and examine the scarecrow, then wear the overalls. Go to the garden path via the plain plain and thus into the town, taking the matches from the mall and the boathook from the crossroads.

At the cobble square only enter the chemist's at this stage; buy the granules with the bronze coin and return to the middle of the beach, picking up the phrase book as you go.

To be continued....

● *See you next month. Until then, happy adventuring.*

Hall of Fame

Ian Rainey's solution to **Castle Quest** *(conclusion):*

Hold the aqualung in your hands and jump off the edge, where you first landed in the water. Go up the ladder on your left and make your way to the pillar where you collected the first torch.

Jump off the edge, and when you go over the bucket press P. Make sure you still have the aqualung in your hands, put the line under the bucket and while you are still in the water press D, R, S, and P in that order. The bucket is now filled.

Go back to where you left the torches and use them as described in the July issue to catch the red men. Let them into the spiders' area but this time go to the left hand side and through the wall.

Go down the stairs and across the gaps, recover the bucket ready for the witch and when she is close, throw the water to kill her.

Keep going left for the gap with the wand in it. Leaving the sword at the top, jump into the gap, pick up the wand and store it. Next, recover the stool and use it to get out and pick up the sword again.

Move left and climb the next ladder. Recover the aqualung and follow the path past the coin into the water. Climb the ladder to your left and go towards the Troll's bridge.

Descend the ladder before the bridge and jump the two gaps to the other side. Go down the ladder here and kill the two yellow guards with the sword. Move right, but don't go up the ladder or into the water. Finally, recover the wand and throw it right (at the wall) to reveal the Treasure.

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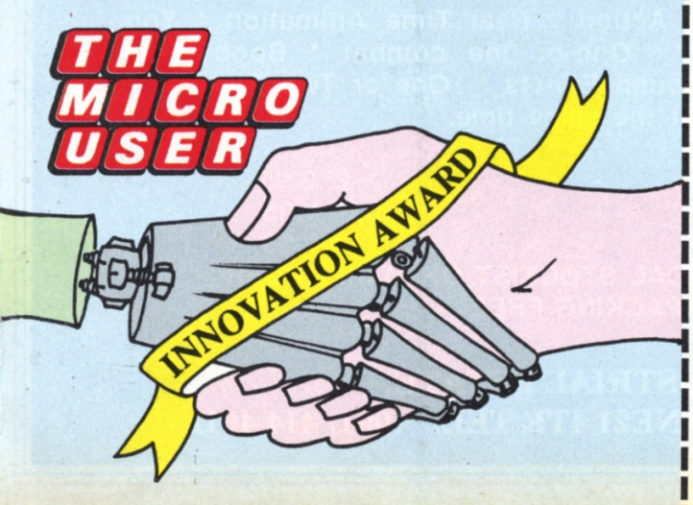

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It is designed to take advantage of the high-speed processing power of the 32 bit Risc processor in Archimedes micros and will be available this autumn.

Logotron promises it will cost no more than the existing Logo for BBC Micros.

The product will be functionally compatible with the current version – virtually the standard Logo in British schools, with over 20,000 copies sold in the UK since January 1985.

The new Logo will provide "a considerably enhanced performance" says Logotron (0223 323656). It has been designed to Logotron's specification by Acorn's software development team in Cambridge.

The company intends to produce new documentation to show ways in which Logo users can benefit from the power of the Archimedes.

Technical director Christopher Roper said: "The first generation of 8 bit educational computers was never able to do full justice to the potential of the language – their limited memory space and relatively slow processors meant that Logo was seen by many people as a toy language.

"This will change rapidly when people see Logo on the Archimedes. We expect the new Logo to be used at every level of the educational system by students and teachers who want to develop their own ideas about computers.

"Logotron has already pushed back the boundaries of Logo use in schools with Music Logo and Control Logo to run in association with the BBC Micro and Master series.

"The new Logo will build on these foundations. Schools already using Logotron Logo will be perfectly at home with the new software".

Holiday language

THE Lydbury English centre in Shropshire is begun offering BBC Micro-based courses in modern languages.

One-week language holiday breaks are available for those wishing to study French, German, Spanish or Italian.

The centre (05888 233) is also offering three free places in October to deserving overseas students who need to learn English as a foreign language.

These courses, which include 26 hours tuition and accommodation, are worth £316 each.

Proprietor Duncan Baker told *The Micro User*: "Both schemes are part of our new programme of diversification built around the BBC Micro.

"We can now offer modern language training in our lovely South Shropshire setting, while the three mini-scholarships in English will help overseas students who would not ordinarily be able to afford a residential course".

Takeover

THE education division of Austin Taylor which produces electronic, pneumatic and microelectronic teaching aids for the BBC Micro has been taken over by Abacus Teaching Systems (0286) 870689).

The new company says it will continue to supply the popular Slotted Matrix system as well as CAD software programs, known as Pneucad and Electrocad, and the Connect 8 computer interface.

Open time

THE problems of allocating time at open evenings between teachers and parents would seem to have been overcome by a new BBC Micro program by Tony Thornley of Highfields School in Matlock.

It has usually been the responsibility of the head teacher to work out who meets whom and for how long – a time consuming process often taking weeks.

The new program, known as Parents Evening Scheduling by Computer, has been designed to solve the problems caused by large numbers of parents wanting to met a few teachers.

It is essentially a time management program and comes on a single 5.25 inch disc and contains six distinct units.

The units cover setting up the basic information, input of staff data, input of parent data, checking data and determining priorities, producing the schedule and amending and printing the appointments.

The program requires a BBC Micro with operating system 1.2 or later. Further details can be obtained from Tony Thornley (0629 55589).

Speeding up Supastore

A NEW version of the schools database Supastore has been released for the Master Compact by ESM Software.

It is said to run even quicker than the current BBC Micro version, which can hold thousands of records and recall them in seconds.

"Information that could never be processed satisfactorily by hand can be sorted and then cross-referenced immediately, making Supastore invaluable for school administration, pupil records, library management and more", says ESM (0223 65445).

"Also important is the fact that it can accomplish more than most other databases and with greater ease, quicker search and the ability to store up to 250 fields per record".

Dial a service

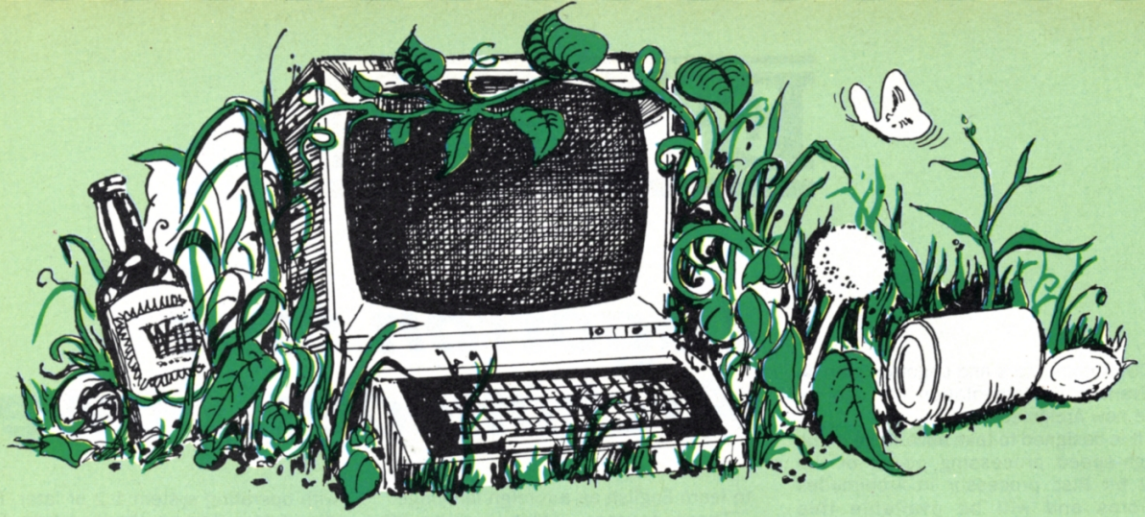
BUDGET auto-dialer software, for use on a BBC Micro with the Dacom DSL 2123 AD schools modem, is available from Craig Evenson of Bradford.

The package works as an emulation file for the Commstar rom by Pace so procedures such as X-modem and telesoftware downloading can still be used.

Any system can be dialled automatically without using a telephone. The user selects the service required from a menu screen, the number is then dialled and a report on the call's progress is made until connection is completed

When connected the software sets up the correct protocols for the system and enters the chat mode. Price £12 on disc.

Further details are available on Craig Evenson's bulletin board (0274 41156) which operates on 300/300 or 1200/75 baud and is open 24 hours a day.



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EDUCATION NEWS

The prize chasers

Deidre Colledge of Shell UK Public Affairs Department watches children at Knowle Infants School, Solihull, at work on their computer.

CHILDREN at the Knowles Infants School in Solihull are using a BBC Micro in their bid to win the £1000 first prize in the Shell Link schools software competition.

There is also a second prize of £500 and three further prizes of £200 each.

Students have to produce a program that can be used in the primary classroom.

They are expected to research and produce their own software for the teaching and learning of a particular subject. It could set a problem, tell a story or suggest an experiment, all aimed at the primary age group.

The children at Knowles are up against stiff opposition from other schools in Birmingham, Dudley, Wolverhampton, Hereford and Worcester.

Deirdre College, Shell UK's public affairs officer said: "The idea behind the competition in the West Midlands is to promote links between schools and industry and to increase Shell's knowledge of educational software requirements".

Schools who wish to register for the competition can get further details from Shell UK (021-644 5249).

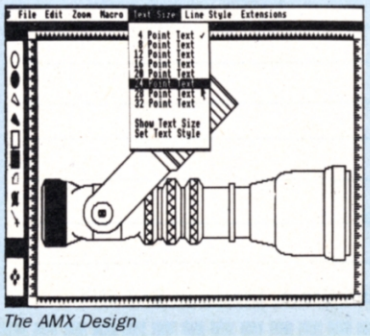
Drawing for all

WHAT is claimed to be the most comprehensive drawing package available for the BBC Micro has been launched by Advanced Memory Systems.

Called AMX Design, the Cad package is intended for schools and colleges.

Students can produce drawings from the simplest PCB design up to the most intricate architectural plans, selecting from drawing tools such as ellipses, circles, arcs and boxes.

Advanced features like full zoom macro options and multi-level drawing planes are included as standard.



The AMX Design

The product will output to any Epson dot matrix or compatible printer, and it supports the Penman and Linear Graphics Plotmate plotters. Price £69.99 from AMS (061-941 6344).

Find the software

BRADFORD company Brilliant Computing, which provides programs for the severely handicapped, is having difficulties filling the demand for new software.

The problem lies in the lack of short graphic and animated sequences to maintain interest and provide variety to motivate users.

Nick Pronger of Brilliant Computing (0274 632223) said: "Although we have lots of program ideas it takes a long time to produce the graphics. We would like to hear from anyone who either has programs that may be suitable and will run on the BBC Micro, or from programmers who would be willing to write software on a fixed price contract for us".

Young editors

A BOOKLET titled Young Fleet Street Editor has been published for use with the Fleet Street Editor graphics package from Mirrorsoft.

It is intended as an easy-to-use reference for children and to help parents and teachers stimulate interest in designing work incorporating pictures, headlines and a variety of fonts.

The step-by-step projects encourage experimentation with page layout and design for birthday cards, newsletters and posters.

The booklet is priced £2.20 and bulk discounts are available from YFSE, 38 Oatland Drive, Otley, West Yorkshire LS21 2AY.

Nursery learning

FIVE traditional children's favourites are colourfully featured on Nursery Rhymes, the latest educational program for the BBC Micro from Database Software.

Aimed at children of nursery school and pre-school age, it uses full colour graphics and sound to make learning a fun activity.

Correct answers help the child complete the storyline of each rhyme, which is played via the micro's sound channel when the task has been successfully completed.

Jack and Jill, Hey Diddle Diddle, Hickory Dickory Dock, Humpty Dumpty and See Saw teach a variety of skills including word recognition and basic spelling, dexterity and co-ordination, numbers and telling the time, and recognising shapes and patterns.

Nursery Rhymes is available from Database Software (061-429 9230) price £5.95 on tape and £6.95 on disc.

DESKTOP PUBLISHING AWARDS 1·9·8·7

Desktop Publishing is the biggest growth area in microcomputing today. Many of the UK's top graphic designers have embraced it, harnessed its tremendous potential, and produced extremely eye-catching layouts.

But it has also enabled people from all walks of life, from owners of small businesses to club secretaries and community groups, to become publishers in their own right.

Pira, the UK technology centre for the printing and publishing industry, is to sponsor annual awards for the best examples of Desktop Publishing.

Entries are invited from individuals, companies or organisations.

There will be three major awards:

Category One:
Best newspaper or magazine

Category Two:
Most outstanding company report

Category Three:
Best leaflet, newsletter or brochure

The awards will be presented to a nominated representative of the winning entry at the first Desktop Publishing Show in October.

What you have to do

Supply two copies of the submission, together with a disc containing any relevant files and the completed entry coupon.

Entries can be made for more than one category, but additional entries should be accompanied by separate copies of the coupon below.

All entries must be received no later than noon on Thursday, October 1.

These awards are not open to the staff of Database Publications Ltd., their agents or their families.

The judges' decision is final. The results will be announced at the Desktop Publishing Show in October, and printed in the December issue of The Micro User.

Desktop Publishing 1987 SHOW

Business Design Centre, Islington, London
Thursday, October 15
Friday, October 16
Saturday, October 17

Plus

A special award for the best design produced on a BBC Micro, sponsored by Acorn. The winner of this award will receive an Archimedes computer, the remarkable new machine that is soon to become a major player in the desktop publishing field because of its high-resolution display, innovative use of text and super-fast processing power.

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Send to: Desktop Publishing Awards 1987, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.

Learning time at the zoo

ZOOPAK is a theme package aimed at the infant and lower junior school children. The program is stored on one double-sided disc and is accompanied by a software manual, a book of ideas, activity sheets, key strip, help cards and Concept keyboard overlays. In addition there is a story book called Petra's Dream.

This short tale is designed to link the adventure games of the software to everyday life. It is an entertaining story about Petra who, while on a class visit to the zoo, falls asleep.

In her dream there is a fire and she has to rescue the animals. This is the problem the main adventure game asks you to solve. Once the children have heard or read the story their enthusiasm is catalysed and they find the game relevant.

There are three adventure games, Feeding Time, Petra's Dream and Find Me. They are entirely different and each uses different skills. Very little reading ability is required and all the programs are operated by using the arrow keys, Space, Return, / and N.

The program can automatically be linked to a Concept keyboard and the eight commands are contained in the overlay provided.

In Feeding Time, the children have to feed six of the 10 animals. Two clocks, one analogue and one digital, give them the current time and a display tells at what time each animal is to be fed. By using the arrow keys the pointer is moved up or down to the appropriate animal linking it to the current time.

When the correct animal is selected the children have to find its food cupboard. Using the arrow keys they move around the corridors and pathways until the correct cupboard is located. Then they must return with the food and give it to the animal.

The graphics are superb and it is impossible to fail – there are no wrong answers just less correct ones. The more correct the children are the quicker they complete the task.

The final screen from Petra's Dream

The game is simple yet enjoyable and rewards for success (the animal going "yum yum"). The children love it because they gain a feeling of worthwhile success.

Petra's Dream gives them the task of taking the giraffe, elephant, snake and swan to safety, away from the fire and there are many problems en route.

The program gives few written instructions, but there are visual clues on screen. The children need to identify the problem and then find the solution.

Again the graphics are superb – the children really feel they can identify with the animal as they struggle to find the solution. And struggle they will as they tend to see the clues to success (or failure) unravel before their eyes, and a hit or miss strategy has to be adopted.

This approach leads to a level of addictive frustration and the children become deeply determined to achieve – if only by trial and error. It is all good stuff – enjoyable, amusing and strategy building.

Eventually, they do rescue the animal and lead it to safety and the reward is a picture puzzle. The children are presented with a six piece jigsaw. Each piece has to be moved to the correct place to form the finished picture. It can take ages to juggle the pieces around and you are constantly having to rearrange ideas.

The four animals to be rescued encounter some of the strangest problems. The giraffe goes to the airport, needs to be picked up by a fork lift truck and then has to be reassembled after

The title screen from Find Me

Turn to Page 74 ▶

EDUCATION REVIEW

◀ *From Page 73*

being broken up.

The elephant walks towards the aeroplane and then falls down a mine. To get him out the children have to balance a see-saw using numbers to make the elephant jump to safety.

The swan, too, goes off in the plane and ends up in a tank. The tank has to be filled with water, using three other tanks, to refloat the bird. The combination of tanks and valves has to be worked out, as only the exact quantity can be used.

When the snake goes off in the plane, it crashes into the sea, and the snake just changes places with the octopus.

Easy you may think, but the octopus moves in exactly the opposite direction to the snake and there are many pitfalls to avoid, before arriving at their respective destinations.

The program has the knack of giving children a task that engrosses them. It is not an easy exercise, but with observation of the screen for clues, plus using hints from failure, strategies can be evolved to go forward.

Find Me requires you to find Petra, who is lost in the zoo. A picture map is shown on screen and the children are given a clue to Petras whereabouts by describing something she can see.

The children select one of the four map sections which is then enlarged. A second clue is given and the children select another quarter of the map which is expanded, then the process is repeated for a third clue.

If (when) the children find her, Petra thanks them and they are returned to the start of the program for another go with Petra in a different place.

This game is the weakest of the three. There is nothing fundamentally wrong with it, but it pales into insignificance after the quality of the previous two.

This is a theme pack and you are presented with more than games. Tell-a-Tale allows the children to write their own zoo pack books. This simple word processor is designed for use with young children and is also ideal for the inexperienced teacher. The manual explains the two levels available.

There are a number of print options including normal, large text and italic print. Concept keyboard overlays can also be created for use with the program.

Notebook is a simple introductory database which offers nothing more than an information store – there is no search facility. It has 40 pages to use on each file and you can have between three and eight headings. The file can be saved, edited or added to if not complete. You can print pages when in the edit mode, but only one page at a time.

The main screen from Feeding Time

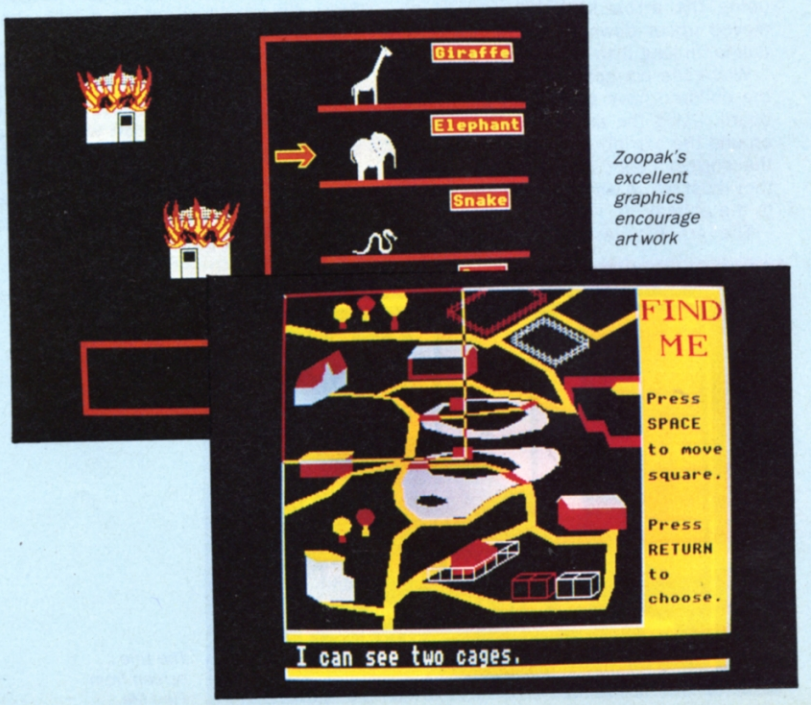
Zoopak makes a concerted effort to give the teacher a piece of integrated software for a topic. The book of ideas has a wealth of suggestions and the program can be used as part of a zoo visit.

The excellent graphics encourage art work. The story of Petra's Dream is an ideal lead in to creative writing. Without using other software, the teacher has a simple database and a word processor built in, therefore the scope for computer aided learning is considerably broadened.

The pack is well thought out, well presented and educationally sound. Children loved it and learnt a considerable amount as well.

Andrew Heaton

Product: Zoopak
Price: £24.15
Supplier: 4Mation, Linden Lea, Rock Park, Barnstaple, Devon EX32 9AQ.
Tel: 0271 45566



Zoopak's excellent graphics encourage art work

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The MASTER REPLAY tape to disc utility is packed full of useful features and cannot be surpassed for it's efficiency and ease of use. Built-in formatting, verification and automatic file creation with the saving of as much memory as required into a maximum of 22 files per disc, are only some of the facilities included. Operated by single key presses and a built-in switch the system is invisible when not in use. 'Anti-piracy encoding' restricts REPLAY discs to personal use. Available as self-contained, or as an add-on to the ROMBOARD '3'.

***MASTER REPLAY (Self-contained) – £41.95**
***MASTER REPLAY (Add-on) – £36.95**

The MASTER to 'B' conversion kit enables most BBC 'B' tapes to be used and transferred to disc on the Master (M/REPLAY must be present).
MASTER/B conversion kit – £14.95, (state which M/REPLAY).
Use the ROMBOARD '3' to overlay up to three extra ROMs in place of the unused built-in ROM software. Optional switches (extra) can be used to change over as required.

***ROMBOARD '3' – £19.95.**
Switches:1–£2.00, 3–£4.00

*IMPORTANT – Because all the above products require the 1Mbit ROM (IC24) to be extracted please ensure that this ROM is not soldered into the baseboard.

NEW ROMBOARD '4' may be used instead of, or in addition to, ROMBOARD '3'. Up to four new ROMs can be supported, 'over-laying' the RAM banks or cartridge slots, various combinations may also be set by links. This board incorporates a built-in read/write-protect switch for the RAM banks.

ROMBOARD '4' – £29.95
Independent write-protect switch for one or both RAM banks.

WRITE-PROTECT SWITCH – £8.95

BBC 'B' and 'B+'

The REPLAY System for tape to disc transfer is still the market leader. Easy-to-use routines allow the saving of memory to disc. Extra features allow a screen display to be printed through a suitable printing program, there is a pause facility and mid-play stop and save. Anti-piracy encoding restricts discs to personal use. Versions available to suit all popular disc interfaces.

BBC REPLAY – £35.00
(Please state which disc interface is fitted).

The B+ to B conversion kit expands the number of tape programs available to the B+ user. A board carrying the O.S.1.20 ROM is plugged into the computer and a switch allows selection of normal or 'B' mode.

'B+ to B' Conversion – £25.95,
or without O.S. ROM – £15.95

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The ADDCOMM ROM extends the BASIC language of the computer by forty Toolkit/Graphic commands, and is a firm favourite with all its users as well as excelling in comparison tests published in the leading computer monthlies.

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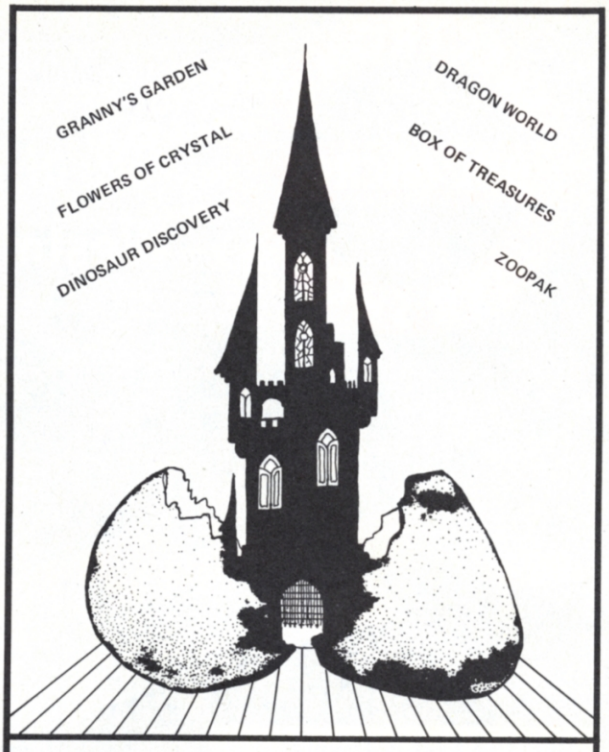

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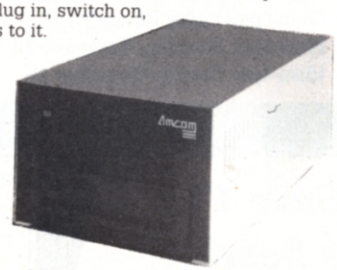

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Micro surgery

Ian Whitmore reports on the BBC Micro in Tertiary Education

MOST articles on the use of BBC Micros in education concentrate on the primary and secondary systems. I welcomed the opportunity to redress the balance for tertiary education by writing about the ways we use them in the Department of Anatomy in the University of Manchester.

In a department with 20 academic staff and teaching responsibilities for several hundred students there are 17 BBC Micros, from the oldest model B to a Master 128 with Turbo upgrade.

Uses of the machines include word processing, using spreadsheets for student mark analysis, and database systems retain data on student performance and research topics. Where appropriate, databases are registered with the Data Protection Agency.

Several machines fitted with modems are used to access distant databases such as Datastar in Switzerland for literature searches. We also have one BBC B equipped as a terminal to access the university mainframe system.

During the university term, two of the model Bs are dedicated for use by undergraduates studying for degrees in medicine and dentistry.

Both machines have a medium resolution RGB monitor and a single 80 track double-sided disc drive. They are mounted on trolleys which deny the students access to the disc drive.

The boot option has been set using the links on the bottom right of the keyboard printed circuit board, so that the disc is booted on pressing the Break key only, not when Shift-Break is pressed as is more usual.

If the disc is left in the drive with the drive door closed, it is booted up when the machine is switched on, executing the !BOOT file on the disc.

Modern disc drives with integral power supplies were chosen to minimise disc data corruption occur by switching off the power supply when the disc drive head was loaded (in close contact with the disc). We bought a drive only when we had ascertained that it had internal circuitry to prevent data corruption and its heads were only loaded during read and write.

Even with these precautions we anticipated that discs would be corrupted, so plentiful backup copies are kept. In two years we have not needed to change a disc as a result of this problem.

Further protection from hackers, wanting to use the machines for purposes other than those we intend, is provided by arranging that on the first bootup after switch-on a small machine code patch is loaded. This redirects the Break vectors to perform the commands OLD and RUN. Thus Break restarts the program, while Control+Break reboots it. The Escape key is also disabled within this boot file.

These systems for students offer several hundred true-false type anatomy revision questions. They are called from disc in batches relating to particular areas of study from a menu available on the first screen.

In each session a student's score is kept and updated, and where the student doesn't get the answer right, the correct answer is given.

We use a scoring scheme that gives +1 for a correct one, -1 for a wrong answer and 0 for "don't know" to discourage guessing. The pass level is 50 per cent.

Anatomy is a very pictorial subject, demanding visual representation of features of the body, both in teaching and research. So more recently a lot of use has been made of the various drawing packages on the BBC series.

Of the three main contenders – AMX Superart, Wigmore Artist and Watford Questpaint – I much prefer the last, Questpaint.

I had the chance to review Questpaint and having used it much more since then, I have come to appreciate its outstanding features. Questpaint's ability to provide the whole screen for drawing in Mode 1, and having all facilities accessible from overlaid onscreen Mode 0 menus, makes it particularly suitable for our uses.

As Artist uses Mode 2, it provides full screen multi-colour drawing, but this mode's resolution is inadequate for anatomical illustrations.

We have recently begun to expand the true-false self assessment teaching systems to include colour diagrams of anatomical features. They are drawn using Questpaint and saved as screens which are *LOADed from within the true-false program.

Figure I shows a typical screen, with leader lines showing the structure about which the question is set. The text of the question is also displayed on the screen.

One area I have recently explored is the use of screens created using Questpaint in animation sequences. I am lucky enough to have a hard disc system on my micro at home, and using this it is possible to load screens quickly in succession from within a Basic program.

If the files are physically located one after another on the disc I can get animation speeds of between three and four frames a second. A typical program to run nine frames called 1, 2, 3, 4, 5, 6,

Turn to Page 78 ▶

Figure I: Anatomical diagram with true -false question

◀ From Page 77

7, 8 and 9 would be:

```
 10 *FX229,1
 20 MODE1
 30 VDU23,1,0;0;0;0;
 40 REPEAT
 50 FOR I%=1 TO 9
 60 OSCLI "LOAD "+STR$(I%)+" 3000"
 70 NEXT
 80 UNTIL INKEY-113
 90 MODE7
100 *FX229,0
```

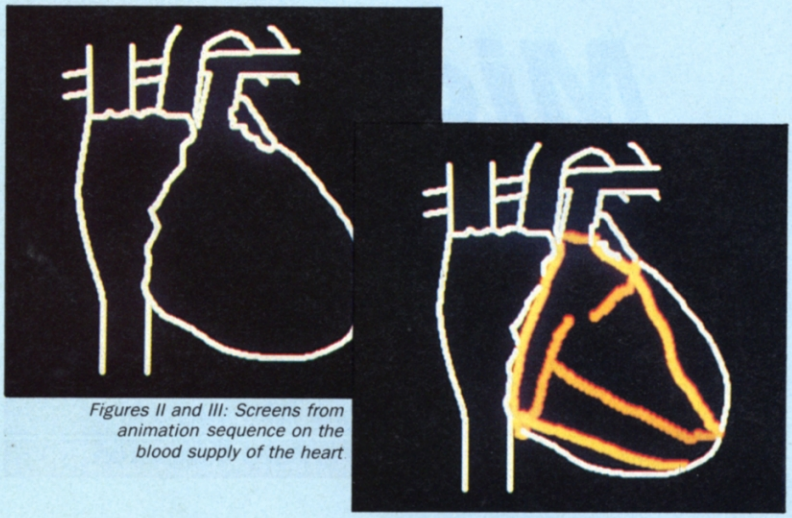
If colours other than the default red, yellow, black and white are to be used, they must be defined before line 40, using VDU19. If different colours are needed for successive screens the *LDSCRN command from the Questpaint utilities disc will load the correct colour palette with each screen, but as it is called from disc each time, the animation speed will be slower.

While this program will work on any disc filing system, the speed required for realistic animation can only be obtained from hard disc systems. As these are still expensive and a little too fragile to leave out for routine student use, I have been able to copy animations on to videotape using the UHF output on the back of the micro.

Using a microphone, it is possible to record a soundtrack to this animation, allowing students to observe it without requiring access to a hard disc system.

Further use of this idea will allow sequences to be recorded which illustrate temporal sequences such as those seen in the development of the human foetus before birth. These are particularly difficult subjects to get across to students, and the use of animated sequences helps considerably.

I expected a problem with alignment of one screen with the next, but found that the cut and paste facilities on Questpaint made it easy to maintain alignment. One surprising feature I met while experimenting was the lack of flicker in parts of the drawing common to successive frames an unexpected bonus.



Figures II and III: Screens from animation sequence on the blood supply of the heart

Two frames from a simple sequence concerning the anatomy of the coronary circulation of the heart are shown in Figures II and III. One of my colleagues uses his BBC micro to prepare screens of text in colour which he then photographs.

He uses the resulting slides in lectures, finding that they are easier to read than most produced by other methods, and that the colour is useful in highlighting different areas.

An area for further exploration would be the use of screen shots of pictures illustrating anatomical features produced using Questpaint.

Although anatomical research does not lend itself to direct use of BBC Micros, they are used extensively in the preparation of publications. The text is created with a word processor, the tables with a spreadsheet and graphs and charts, are drawn, using either a plotting package or an artwork package.

More recently I have favoured the last approach, as it provides more flexibility in layout, and with the greater range of colours and patterns is much better for presentation slides.

The disadvantage is that any scaling must be done by hand, so the use of the gridlock and a grid displayed behind any graph (which can be removed later) is essential. Examples of a histogram and a piechart are seen in Figures IV and V.

We also have a collection of statistics packages for use in the department, some commercial and some home-grown.

Larger statistical problems are explored on the university mainframe system using the BBC Micro terminal.

One area I have not mentioned is in learning about computing. This facility is provided by other departments and the only training we give is in the use of facilities available in the department to staff and research students.

So, in the Department of Anatomy BBC Micros are alive and well, and we anticipate many more years service from them in the future. We are still developing new ideas with the help of the latest software. ■

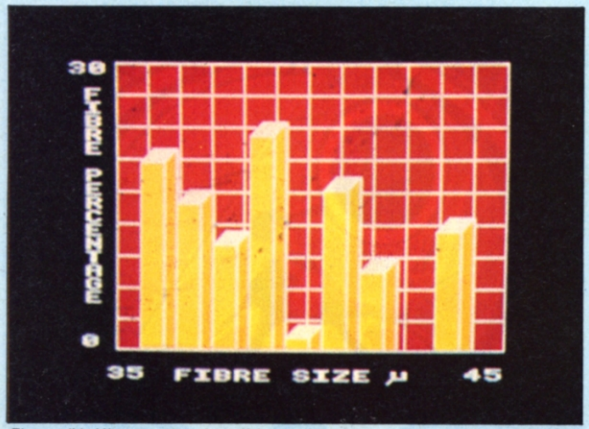


Figure IV: Histogram using dither patterns

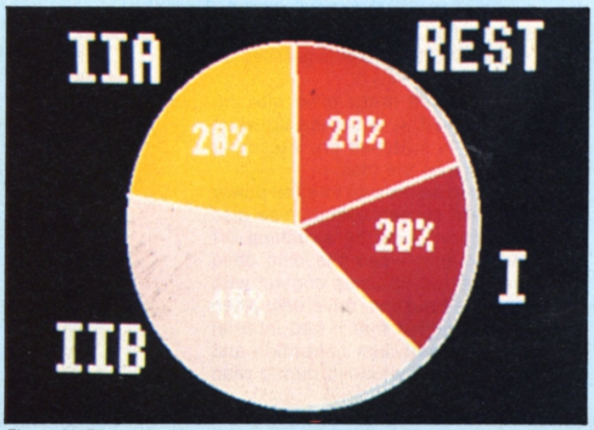


Figure V: Piechart

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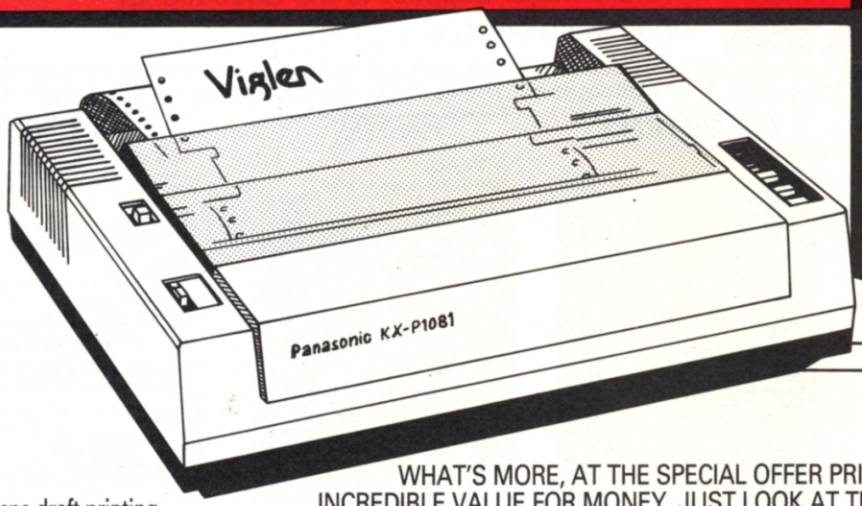

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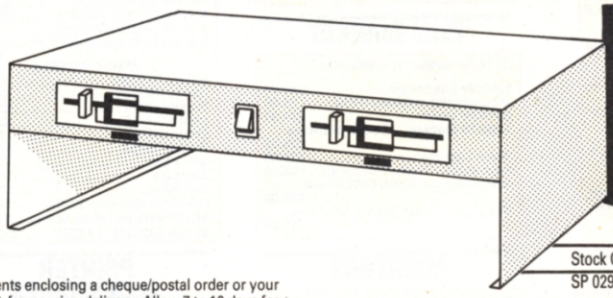

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Bridging that jump

I USE Mini Office II in our school quite often. One facility for which I have found a great need is the double height text in the word processor. Unfortunately, when I use this facility, the text is printed with a gap between the top and bottom halves of the letters. What can I do? – **Sean Harewood, Partington, Cheshire.**

● The reason the gap appears is that the line feed on your printer is switched on, thus giving an extra line feed on the double height text. To prevent this you need to use the command *FX6,13. This can be used from the word processor main menu. Alternatively, switch off the line feed in the printer using the dip switches as described in the manual and use *FX6.

Find the firm

IN the May issue of The Micro User *the Astrid built by Steve Webb was mentioned in the Education News section.*

Could you please print an address from where I can gain more information. – **Marcus Brennan, Whitborne, Worcester.**

● The address is Astrid, SRN Communications, Astrid House, The Green, Swinton, Malton, T017 OSN.

Acorn release

I AM a student presently studying for A'levels, among them computer science, and my friend and I are both programming in C at college for our projects. I have had a BBC Micro since they first came out and I would be very interested to see C on my micro.

I am not, however, just writing in support of Mr Carter (from Letters, August issue of The Micro User*), because in the very same issue his letter appeared, there is an advert for a new Acornsoft rom-based language, C.*

Could you confirm this new release? If this is so, I and many others would appreciate an indepth review of the implementation. – **B.P. Seddon, Hampton, Middx.**

● Acornsoft has indeed just released C as have two other companies, Brasscourt and Beebugsoft. We will be doing a comparative review of all three in the near future.

Beating a hang-up

I HAVE a BBC model B at home and we have a BBC Master in the School of Nursing where I work.

With help from a letter – Moving Wordwise into View – in the June 1986 issue of The Micro User *I have managed to print some text that I transferred into View but I am unable to edit the text or add to it.* – **Felicity Stockwell, Preston, Lancs.**

● To load Wordwise files into View use the READ command instead of LOAD otherwise any control codes that you have in the Wordwise files will cause View to hang-up.

Help the handicapped

I AM in close contact with children of 5 to 18 who are severely handicapped with cerebral palsy but who enjoy using the BBC Micros at their disposal. Most games available rely on speed and accuracy and, of course, these are skills such children do not possess.

Can you please advise me of the source of any information on suitable software.
– **Isabel Thompson, Johnstone**

● Your local education authority will be able to give you the number of your nearest SEMERC (Special Education Resources Centre) who will have the information you need.

Oh, for a librarian

WHEN computers first arrived in schools I thought that one obvious application would be in the cataloguing, issue and retrieval of school library books. The tedium of maintaining card indexes and manually compiling overdue lists would be over.

Years later we are still waiting for a suitable package. True, issue and retrieval can be handled by packages such as Edlib from Addison Wesley, which does have one field available for a search by subject key. But this cannot handle a list of key words.

In the antediluvian days before micros an information retrieval system known as Optical Coincidence Retrieval was developed. This involved one card for each keyword with a grid numbered from 1 to, say, 10,000.

Each item to be catalogued was given an accession number and holes were punched in the appropriate keyword card. Thus it was relatively easy to find details on, for example, Race Relations in South Africa in the 20th Century by superimposing those cards on a light box.

By adding or subtracting cards you could narrow or widen the search quite easily. The major disadvantage of this system, other than the drudgery of punching holes in the appropriate cards, was that materials had to be shelved in accession number order, rather than Dewey Number Order thus making casual browsing impossible.

Surely it is possible to adapt this method to a computer system? I have experimented for many hours with database packages ranging from Datagem to Viewstore, Mini Office to Quest, with no satisfactory result.

We need a system that can handle up to 1400 pupils and stock levels of 15,000 books with a list of perhaps around 1000 keywords to identify subject areas for searches. The package must be sufficiently user-friendly to cater for 11 to 18 year olds and computer-illiterate staff

A few years ago the British Library sponsored the development of the SIR (Schools Information Retrieval) package, primarily on the RM Nimbus, with a trial conversion to run on the BBC Micro (only handling 200 items) but this seems to have sunk without trace. – **Alan Turner, Head of Resources, Prestatyn High School.**

● It's quite a tall order for a BBC Micro in terms of storage although it should be possible using a hard disc. Have any of our readers any suggestions?

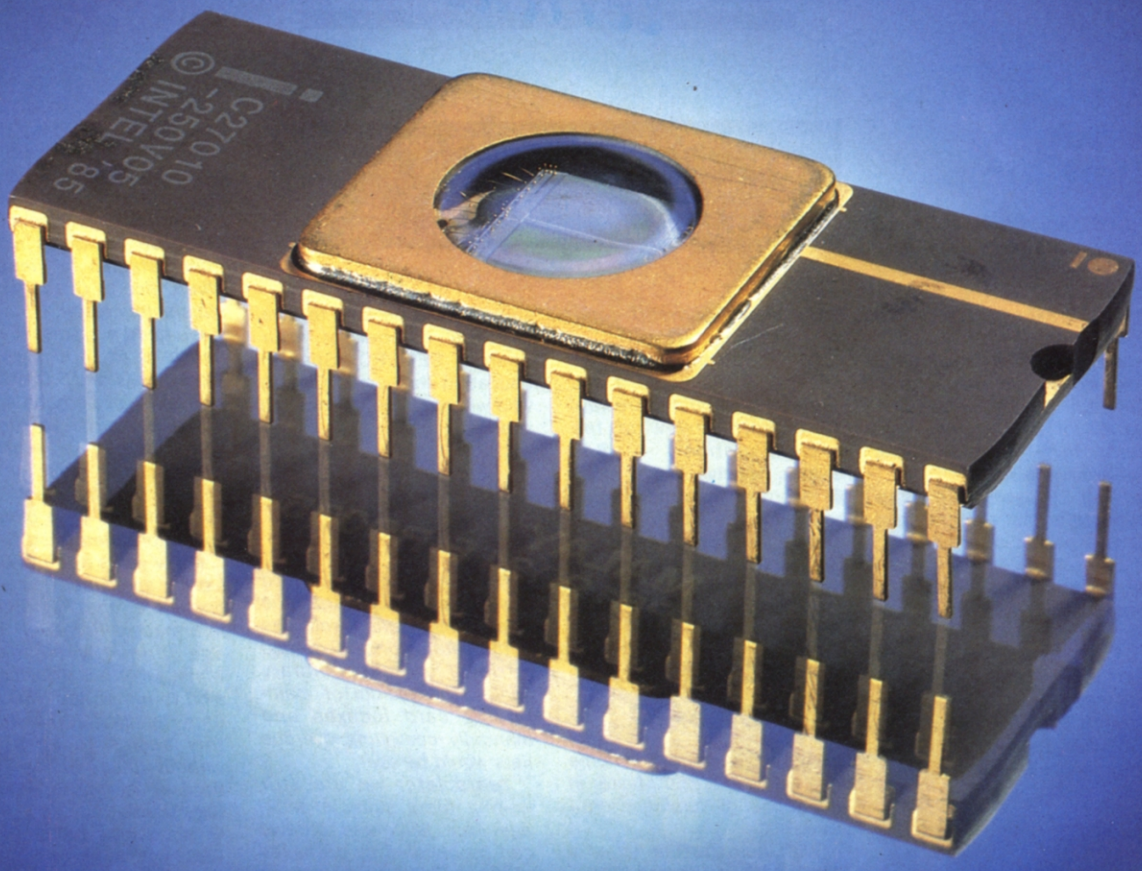
Econet appeal

I WAS wondering if any of your readers have used the Buffer program, from the July issue of The Micro User, *on Econet. This plea is prompted by a sense of impending doom as I watched some of my students valiantly typing it in.*

The program doesn't seem to work on Econet, though this may be due to typing errors at this stage. Or is it that the program needs to access a disc anyway?

I suspect that Econet users would love this program if it did work. – **Mike Mackay, Head of Computer Studies, Downham Market, Norfolk.**

● The simple error in the Printer Buffer program is corrected in the Letters this month – the program should work on Econet. We'd like to hear from any readers who've got it running.



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Compatible with all BBC Micros

Special switching techniques ensure that the 128K ROM appears to the machine as one single 16K ROM - this guarantees that it is completely compatible with the ROM sockets in all versions of the BBC Micro- computer.

Compatible with all the major word processors

SPELL-MASTER has been designed to fully integrate with the most popular word processors on the BBC, WORDWISE and WORDWISE PLUS, VIEW and of course INTER-WORD. While editing in these word processors all that is necessary to control SPELL-MASTER is to press one CTRL key (Usually CTRL-J). This causes a menu to appear listing a variety of options such as 'Check entire text', 'Check word at cursor', 'Continuous check - on/off' etc. Text is checked directly in memory while in the word processor. There are even short-cuts to the menu, for example, pressing CTRL-V in any of the above word processors will start checking the text immediately from the current cursor position. Compare this with the process of checking text in the most highly rated competitive product - VIEWSPELL.

VIEWSPELL	SPELL-MASTER
•Save text from word processor. •Enter spelling checker. •Load text into spelling checker. •Check the text. •Go back to word processor. •Load marked text. •...finally, make corrections.	•Press CTRL-V • make corrections.

Check entire text

In a word processor, SPELL-MASTER can check at up to 10,000 words per minute. Whenever a word is indicated as misspelt the user is given three simple choices. Replace the word with another selected from the dictionary, ignore the word altogether or add it to a user dictionary.

Check as you type

Because the dictionary is ROM based it is possible to check words as they are typed. This feature works with all the above named word processors and does not slow the operation of the word processor at all. Whenever an incorrect word is entered the computer will bleep; the word may then be corrected or simply ignored.

User Dictionaries

SPELL-MASTER supports extensions to the main dictionary in sideways RAM or ROM. This has the advantage that there is no speed degradation when checking against user dictionaries, since there are no disc accesses required at all. Once a word is added to a user dictionary it is treated as if it is present in the main dictionary.

SPELL-MASTER can support a number of separate dictionaries at once, each sideways RAM or ROM holding up to 3000 additional words. Once a dictionary has been created it can be 'burned' into an EPROM to form a permanent extension to the main dictionary.

Provision is made for editing any dictionary extension, for adding or deleting words in bulk, and directly loading or saving user dictionaries from or to sideways RAM.

Additional star commands

These can be issued from any language ROM such as spreadsheets or BASIC (they can even be included into BASIC programs). Some of the 8 commands are:

`*CROSSWORD` - Will search the entire dictionary for words that exactly fit the search pattern. For example *CROSS. ##M#U#ER would list ARMOURER, COMMUTER, COMPUTER. It takes about 8 seconds to check against all 59,000 words.

`*ANAGRAM` - Will list all the words in the dictionary that contain the same letters as those specified.

`*FUZZY` - Will list all words that sound something like the one you are searching for. If you are not sure of the spelling of a word then entering the approximate spelling here will generally list the word you are looking for.

Price: £59.00 incl.

Upgrades

Owners of the older two chip versions of SPELL-MASTER can upgrade to the single chip version for £25.00. However this new version is functionally equivalent and so it should not be necessary to upgrade.

2nd processors

Due to its unique design SPELL-MASTER will not work with word processors running on the 6502 2nd processor, although there are facilities provided for checking long text files.

VISA

Computer Concepts

Access

Gaddesden Place, Hemel Hempstead, Herts HP2 6EX Telephone: (0442) 63933

Watford Electronics

Jessa House, 250 Lower High Street, Watford WD1 2AN, England
Tel: Watford (0923) 37774 Tlx: 8956095 Fax: 01 950 8989

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Acorn
The choice of Experience

The choice after the Experience

BBC MASTER 128K Micro incl. Acorn's: View, Viewsheet, ADFS, BASIC Editor & TERMULATOR **£395**

BBC MASTER with Turbo Board **£493**

512K Processor Add on Board "inc. Mouse and GEM package" **£195**

BBC AIV (Domesday) System **£3479**

SPECIAL OFFER

FREE . . . £65 worth of Software

Gemini's OFFICE MATE & OFFICE MASTER packages on Disc consisting of: Database, Spreadsheet, Beebplot graphics. Accounts packs: Cashbook, Final Accounts, Mailist, Easyledger, Invoice & Statements, Stock Control and ***Watford's*** *unique VIEW PRINTER DRIVER ROM – an essential tool for all users of the Master's built-in VIEW wordprocessor; with every Master purchased from us.*

ADD-ONs & ACCESSORIES

Turbo 65C102 Add-on Module	£99
BBC MASTER ET (Econet Terminal)	£315
Econet Module for the Master	£43
Twin ROM Cartridge for Master	£8
Quad ROM Cartridge for Master	£12
Universal Processor Adaptor	£75
Reference Manual I (No VAT)	£14
Reference Manual II (No VAT)	£14
Advance Ref. Manual (No VAT)	£19
64K Upgrade Kit for B+	£32
Acorn 1770 DFS Kit complete	£42
ECONET Upgrade Kit for BBC	£42
ALL ECONET UPGRADES Available	
Z80 Acorn 2nd Processor package	£325
ARIES' Professional IEEE Interface	£238
Acorn IEEE Interface Complete	£265
Acorn Teletext Adaptor	£95

BBC MASTER COMPACT

All Master Compact Microcomputers are supplied complete with an integral 3½" Disc Drive and various educational and professional bundled softwares.

System 1	Standard Package	£349
System 1A	System 1 + TV Modulator	£363
System 2	System 1 + Green Hires Monitor	£399
System 3	System 1 + Medium Res Colour Monitor	£549

RS232 Kit for BBC Compact **£26**

Additional 3½" Drive for BBC Compact **£95**

(Securicor carriage £7)

The 80186 Co-Processor

This package consists of the Master 512 board, Watford Co-Pro Adaptor, Acorn 1770 Disc Upgrade and Acorn ADFS. The Master 512 board using the 80186 16 bit Processor at 10MHz and running Digital Research DOS Plus, gives a high degree of IBM compatibility at an extremely reasonable price. Included in the 512k package is a mouse and the amazing Digital Research GEM suite of software; GEM Paint, GEM draw and GEM desktop giving a complete Mouse Icons environment (All other GEM packages will work on the 512k). Famous packages that will work with the 512k board include Wordstar, Dbase II, Lotus 123 and many others. The only requirement to upgrade any BBC Model B to this system is you must have twin 80 track disc drives.

£275

ARCHIMEDES

Acorn's New range of BBC Micro based on RISC Technology

Model 305

● Basic System	£799
● with Green Monitor	£849
● with Colour Monitor	£999

Model 310

● Basic System	£875
● with Green Monitor	£925
● with Colour Monitor	£1075

VARIOUS PRINTERS & ACCESSORIES

● FX80/85 Tractor Feed	£35
● Hi-80 Refils, set of 4 Pens	£7
● EPSON Paper Roll Holder	£17
● EPSON LX86 Printer	£189
● EPSON LX80/86 Tractor Feed	£20
● EPSON LX80/86 Sheet Feeder	£49
● EPSON LQ800 Printer	£429
● EPSON LX800 Printer	£210
● EPSON FX800 Printer	£315
● EPSON FX1000 Printer	£439
● EPSON EX800 Printer	£405
● Colour option for EX800/1000	£55
● EX Colour Ribbon	£18
● EPSON LQ800 Printer	£439
● LQ800 Tractor Feed Attachment	£39
● FX/LX800 Single Sheet Feed	£139
● FX/LQ1000 Single Sheet Feed	£149
● HR15 Brother RS232 Daisy Wheel	£275
● HR20 Brother Daisy Wheel Printer	£349

(Securicor carriage charge on printers £7)

PRINTER SHARERS

(Ideal for School environment)

Connect 3 BBC Micros to 1 Printer	£60
Connect 6 BBC Micros to 1 Printer	£99

PRINTER CHANGER

Connects 3 Printers to 1 Micro **£65**

(Cables extra, specify type required when ordering)

65C102 2nd PROCESSOR

This amazing package consists of the Acorn 65C102 'Turbo' Board, the Watford Co-Pro Adaptor and Acorn 1.2 DNFS ROM. The 'Turbo' board, running at 4MHz with 64k of additional RAM will increase the speed by between 50 and 200% depending on the application running, and allow a BASIC program of upto 44k in any screen mode. Simply by plugging in the Co-Pro and the DNFS ROM with its special Tube host code and you massively increase the power of any Model B.

£139

SPECIAL OFFER

EPROMs for BBC's Sideways ROMs.

2764-250nS £3.50

27128-250nS £3.75

RAMs (Low power) for ATPL, WATFORD, etc., Sideways ROM Boards

6264LP (8K) £2.70

2 × 6264LP (16K) £5.30

KAGA/TAXAN PRINTERS

(IBM/Epson compatibles)

Kaga KP815 Printer	£269 (carr £7)
Kaga KP915 Printer	£350 (carr £7)
RS232 Interface	£49
RS232 Interface with 2K Buffer	£69
RS232 Interface with 16K Buffer	£89

RX & FX PRINTER INTERFACES

Epson interfaces fit inside the printer to allow connection using techniques other than Centronics.

RS232	£27	RS232 + 2K Buffer	£55
IEEE 488	£65	RS232 & 8K Buffer	£75

PRINTER LEADS

Centronics lead to connect BBC micro to EPSON, KAGA, SEIKOSHA, NEC, STAR, JUKI, BROTHER, SHINWA etc. printers.

Standard length (4 feet long)	£6
Extra long (6 feet long)	£8
Compact's Special Centronics Lead	£9
RS232 Cable	P.O.A.
IBM Parallel 1 metre Cable	£12

PRINTER RIBBONS & VARIOUS DUST COVERS

Type	Ribbons	Dust Covers
BBC Micro	–	£3.50
BBC Master	–	£4.00
Brother HR15/HR20	£3.00	£5.00
FX100	£7.00	-
FX80-MX80-FX85	£4.50	£4.95
RX80	£4.50	£4.50
LX80	£4.00	£4.50
LQ2500	£9.00	-
Centronics GLP	£4.00	£3.75
KAGA KP810	£5.25	£4.75
Panasonic KX1080/81	£4.50	£4.75

Our attractive Dust Covers are manufactured from translucent PVC. The seams are stitched and edges are taped to prevent splitting due to continuous use.

Listing Paper (Perforated)

1,000 Sheets 9½" × 11" Fanfold Paper	£7
2,000 Sheets 9½" × 11" Fanfold Paper	£12
1,000 Sheets 15" × 11" Fanfold Paper	£9
1000 Sheets true A4 Fanfold Paper	£11
2000 Sheets true A4 Fanfold Paper	£21
Teleprinter Roll (Econo paper)	£4

Carriage on 1,000 Sheets £1.50

PRINTER LABELS

(On continuous fanfold backing sheet)

1,000 90 × 36mm (Single Row)	£5.00
1,000 90 × 36mm (Twin Row)	£4.90
1,000 90 × 49mm (Twin Row)	£7.50
1,000 102 × 36mm (Twin Row)	£6.25

Carriage on 1,000 Labels £1.00

Panasonic KX-P1081

(Now IBM/Epson Compatible)

Available NOW at a superbly realistic price, the KX-P1081 perfectly balances features, quality of construction and Value for Money to produce the printer of tomorrow, here today, ready to sweep the current generation of machines away.

Ingenious innovation in terms of software control codes permits great flexibility when it comes to defining the print style. A nippy **120 cps** of clear Draft text backs up the crisp 24 cps Near Letter Quality text mode, with upto 40 superbly useful downloadable characters. A delightful range of assorted character widths is efficiently supported, with sizes ranging from a broad 5 cpi to petite 17 cpi, EVEN in NLQ mode. Some of the extensive support for serious use includes specialised functions to perform justification, centering and even left and right ranging. Proportional spacing permit even greater freedom when it comes to advanced use. Not only is the full Epson RX compatible control code set implemented, but extra codes have also been added to cater for the NLQ options, etc.

A full 96 ASCII character set is supported, with an extended set of 32 international characters and IBM special characters as well as IBM block graphics characters. A 1K Print Buffer alleviates much of the wait time normally associated with printing, whilst the bi-directional logic seeking print head takes the quickest route to print as required.

(Price inludes, FREE a 4ft Printer Lead, and a Dump Out 3, Screen Dump ROM worth £35 with every printer purchased from us).

Special Price: **£155** (carr. £7)

Optional RS232 Interface: **£39**

Panasonic KX-P3131 Daisy-Wheel Printer

This low-cost high-performance Daisy Wheel printer is ideal for anyone wishing to produce clear, immaculate letters or reports. It delivers, flawless text at 10, 12 & 15 CPS. Supports proportional spacing. Is Bi-directional. logic seeking. Printing speed: 17CPS. Has 6k printer Buffer. A printer of similar spec could cost a lot more than our ridiculously low price of:

Only **£245** (carr. £7)

Single Sheet Feeder	**£195**
Tractor Feed	**£90**
Spare Ribbon	**£3.00**

Acorn-Olivetti JP101 Ink Jet Printer

One of the main problems with most printers is that they are hopelessly noisy. How often have you wanted to print something late at night but not done so for fear of waking the children? Also ideal for those working in quiet environments such as libraries, etc. Silence the complaints with the serious solution from Watford at the amazing cost of only **£59**

(Offer valid while present stocks last)

JP101 accepts 9½" standard fan fold paper or single A4 sheets. Tractor & Friction feed supplied as standard – print speed 50 cps.

Pack of 4 refills **£10**

Screen Dump ROM for JP101 £10

Anti-Glare VDU Screen

This extremely effective, easy to install, 12" VDU screen eliminates harmful glare, improves contrast on colour monitors. Increases productivity in offices. A must for all wordprocessor users.

£12

Printer Stand Type-YU-S25

This new professional printer stand takes hardly more space than your printer. Due to the positioning of the paper feed and re-fold compartments ie. one above the other, the desk space required for your printer functions is effectively halved. Additional facilities include: Easy access to paper from both sides, used with both top and bottom feed paper and with its dial controlled paper feed system with adjustable deflector plates it ensures smooth paper flow and automatic refolding.

£34

We stock a range of monitors to suit all needs. Choice of a monitor is a matter of personal taste so we recommend that whenever possible, you ask for a demonstration at our shop. All Monitors are supplied complete with connecting lead.

MICROVITEC 14"

- 1431 – Medium resolution as used on the BBC television computer programme **£175**
- 1451 – High resolution, suitable for word processing in mode 0 **£225**
- 1441 – High res, exceeds the capabilities of the BBC micro **£359**
- 1431AP RGB + PAL and AUDIO **£199**
- 1451AP RGB + PAL and AUDIO **£255**
- Dust Cover for Microvitecs **£5.50**

KAGA-TAXAN 12"

- TAXAN KX117 Hi-res Green Monitor **£80**
- TAXAN KX118 Long persistence Hi-Res Green Monitor **£90**
- TAXAN KX119 Ultra-Hi-Res Amber Monitor **£90**
- TAXAN Super Vision 2 **Type 620** Hi-res RGB Colour monitor. Ideal for Wordprocessing **£269**
- **TAXAN Super 3, Type 625** Ultra Hi-res, RGB Colour) Text mode switch allows monochrome text display in Green, Amber, White reverse or White on Blue **£319**

STAR BUY

- **PHILIPS 14"** Hi-Res, dark glass, attractively finished Colour Monitor – supplied complete with RGB, SKART and Audio/Phono connectors. A push-button switch toggles between Hi-Res monochrome green text mode and full colour display.

ONLY £209

ZENITH

"Test Bureau Recommended for use in Education"

12" high resolution monochrome monitor. Ideal for word processing as its green or amber screen is very restful to read. (These are the same professional quality, stylishly finished monitors as used in the larger Zenith PC Systems.)

Green (New Design) Hi-res	**£69**
Amber (New Design) Hi-res	**£74**

LEADS

BNC Lead for Zenith or Philips	**£3**
Skart Monitor Lead	**£5**
RGB lead for KAGA	**£3**

N.B. carriage on Monitors **£7** (securicor)

SWIVEL BASES

for Video Monitors

By placing your monitor on one of our superb swivel bases, you gain the freedom to adjust the monitor viewing angle to suit your needs. By doing this, you alleviate eye strain and reduce back stress. Front adjustable without lifting the monitor.

for 12" Monitors **£10** (carr. £2.50)
for 14" Monitors **£14** (carr. £2.50)

MEGABUFFER 256

This new Megabuffer 256 from Watford is a full featured 256K Printer Buffer. It allows the computer to print 256,000 character in a short time thus freeing the computer very quickly. In short it makes light work of printing large documents, screen dumps, etc. It is extremely simple to connect. The features are:

- Low Cost, High performance.
- Improves efficiency by making more efficient use of computer and printer.
- Compatible with any computer and printer that uses Centronics Parallel connections including all BBCs, IBM PCs, etc.
- Total compatibility with all software.
- Cheaper phone bills when using your Modems.
- Ideal for those doing large graphics screen dumps that are slow to print.
- Multi-Copy facility allows you to print several copies via Megabuffer without going through your computer.
- Data Dump facility is included.
- Built in test unit for both the buffer & your printer.

In conclusion it can safely be said that MEGABUFFER 256 is the ultimate printer Buffer for both the amateur and professional user.

Only £149 (carr £2)

CO-PRO Adaptor

Now for the first time you can add the Master Co-processor boards, to your standard BBC model B, or B Plus. With this brand new launch from Watford Electronics you can attach any BBC Master co-processor to the original BBC Micro. Once again Watford strides ahead with a new concept in BBC B Micro add-ons. This unique external Co-Pro Adaptor, is protected by patent applications.

Use the super fast Turbo Board with your BBC B, it is much faster than the 6502 2nd processor superseding it.

With the 512K addon your standard BBC machine achieves IBM PC compatibility at a realistic price running GEM, Lotus 123 and many other programs. Included with the 512k package is a high precision mouse and the Digital Research GEM suite of software; GEM Desktop, GEM Write GEM Paint. This requires both the 1770 DFS and the ADFS to be fitted to your computer.

To use other co-processors you require a BBC B with DNFS 1.20 or higher, or BBC B+ fitted with 1770 DFS 2.20 or greater. Co-processors work exactly like a second processor.

Master owners may use Co-Pro to add a second Co-processor externally.

Watford, brings power to your BBC at only:

£50.00 (carr £5)

Continued

THE EPSON RX-FX-KAGA PRINTER COMMANDS REVEALED (BOOK)

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out. Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX-KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English, how to use and make the most of your KP810, Canon PW1080A or any Epson FX80 compatible Printer with the BBC Micro, both from Basic and Wordwise.

It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

£5.95 (No VAT)

NOW WITH EXTRA FEATURES AT NO EXTRA COST – Watford's latest DFS 1.44

- Incorporates Acorn's Official Tube Host Code so that those with 2nd processors no longer need to waste a ROM socket on the DNFS.
- Option to DOUBLE the speed of BPUT and BGET.

If you already have the Watford Electronics DFS and wish to incorporate these new facilities ten simply return your existing DFS ROM to us together with £5 remittance for an upgrade. Please pack the ROM securely and address the package to our Upgrades Dept.

WATFORD's & ACORN's SINGLE DENSITY DFS

Watford's popular and widely acclaimed DFS has now been available for four years, and has gained a large following amongst serious users of the BBC Micro. Owners of Acorn or any other standard DFS can upgrade to our "Ultimate" DFS merely by replacing their DFS ROM. See below for this upgrade. ***(P.S. Watford's highly sophisticated DFS is fully compatible with Acorn DFS). (not Acorn's 1770 DFS)***

- *Complete Disc Interface Kit including DFS ROM and fitting instructions* **£58**
- *Acorn's 0.90 DFS Kit complete* **£55**
- *DFS Manual (Comprehensive)* (no VAT) **£6.95** *(P.S. Our comprehensive DFS Manual covers both Acorn & Watford DFSs).*
- *Watford's sophisticated DFS ROM only* **£16**
- *We will exchange your existing DFS ROM for Watford's Ultimate DFS ROM for only* **£12**
- *DNFS ROM only* **£17** ● *ADFS ROM only* **£25**
- *Watford's DFS is exclusively available from Watford Electronics and their appointed dealers only. Every ROM carries a special label with LOGO and serial number.*

NEW WATFORD's Mk II Double Density DFS INTERFACE

Many of our customers have wanted to use our superior DDFS and Acorn ADFS together. Now our DDFS board has been adapted to allow the use of Acorn ADFS.

Added features include:

- Acorn ADFS compatible – Use ADFS on our DDFS board.
- Tube host Code – No longer any need to have the DNFS in your machine to use Co-Processors, even the CoPro and Master 512.
- Auto 40-80 Track sensing – no need to fuss with 40/80 track switches (even works with protected disks).
- An extremely powerful 8271 emulation – ensuring compatibility with almost all software.
- New low profile – small footprint board.
- Fits with all third party ROM boards.
- Option to double the speed of file handling operations – BPUT and BGET.
- Operates in both single and double density modes.
- OSGBPB has been recoded, increasing still further the speed of file handling.

Please note that not all DDFS's are capable of providing either the full 80% storage increase or of allowing a file the full size of the disk – Ours allows both of these!

If you already have a DDFS (any manufacturer), and wish to upgrade to our MkII version, then simply return your existing ROM and DDFS board and we will supply the new DDFS for only £30.00.

- Special introductory offer **£39.00**
- DDFS Manual (No VAT) **£6.95**
- We will exchange your Existing Single Density DFS for our DDFS for only **£25.00**

Please note, as the MkII DDFS is a hardware and software upgrade, it is not possible for existing Watford DDFS users to simply exchange their ROM for the new version.

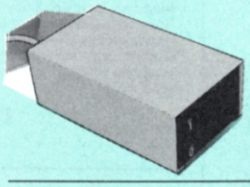
SPECIAL DISC DRIVE/DDFS OFFER

Type CLS400

- The popular Mitsubishi 400k Single Disc Drive, Double Sided, cased with Cables. Plugs directly to your Micro.
- Watford's popular DDFS Disc Interface (allows 720k storage). Will run in both Single and Double Density modes 40/80 track Software switchable.
- A comprehensive User Friendly Manual.

A Bargain at Only **£125** (£6 carr)
(Offer valid while stocks last)

3½" TWIN 800K DISC DRIVE OFFER



These top quality 3½" Disc Drives are attractively finished in BBC beige and are supplied complete with Cables. They run directly from the BBC B/Master's own PSU.

Special Offer **£126**

DISC DRIVE SHARER

(Ideal for educational establishments)

At last, a low cost alternative to the econet system. Watford's Intelligent Disc Drive Sharer allows you to connect 3 BBC micros (model B, B+ and Master series) to a single or double disc drive. Running under any DFS or DDFS, this intelligent unit will automatically queue the computers. Each computer has a status light dedicated to it. If it is green you will get immediate access to the disc, and red means that you are next in line.

The unit plugs directly into the disc drive socket on each computer and is powered by the mains. (N.B. Not compatible with ADFS.)

Launch Price: **£59** (Price includes 3 Cables)

MYSTERIES OF DISC DRIVES & DFS REVEALED (BOOK)

Are you tired of faulty cassettes, and lengthy loading times? Do you want to upgrade your BBC micro to take discs but you get tied up in the plethora of jargon surrounding the choice and use of these systems.

Then The Mysteries of Disc Drives and DFS Revealed is the book for you. It explains in detail the different types of systems available, how they are installed and how to use them. Many examples are given including pre-written programs to call various functions of the DFS available only through Operating System calls. Different types of disc, 40/80 tracks etc. are all explained. This book is ideal for the beginner confused by the plethora of choice available in the marketplace.

£5.95 (Book No VAT)

DISC ALBUMS

Attractively finished in antique brown leather look vinyl. Stores upto 20 Discs. Each disc can be seen through the clear view pocket.

£4

FLOPPY HEAD CLEANER KIT

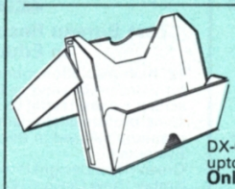
The heads in floppy drives are precision made and very sensitive to dirt. The use of a cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. It is very simple to use. Available in 3½" & 5¼", please specify.

£8

ANTISTATIC LOCKABLE DISC STORAGE UNITS

Gives double protection –
Strong plastic case that affords real protection to your discs. Antistatic helps avoid data corruption whilst in storage. The smoked top locks down. Dividers and adhesive title strips are supplied for efficient filing of discs.

- **M35** - holds upto 50 5¼" discs **£8**
- **M85** – holds upto 95 5¼" discs **£10**
- **M50** – holds 50 3½" Discs **£10**



PLASTIC LIBRARY CASES

◀ Holds up to 10 5¼" Discs. **Only £2.00**

DX-08: This extremely handy unit holds upto 8 5¼" Disc while in use. ▶
Only £2.00

DUST COVERS (For our Disc Drives)

Single CLS (without PSU) **£3.20** Twin CLD (without PSU) **£3.85**
Single CS (with PSU) **£3.95** Twin CD (with PSU) **£3.90**

Quality Disc Drives from Watford

To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.

The first capacity given in the first column indicates capacity in single density mode. That within the brackets is the capacity in double density mode. All disc drive type numbers start with the prefix "C".

The tinting on some of the boxes is used to indicate which Drives are 40 track (non-tinted) and which are 80 track (tinted). All our 80 track drives are already fitted with a 40-80 select switch.

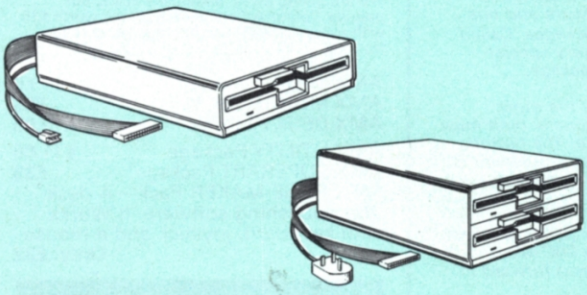
All our Disc Drives are Double Sided and will operate in both Single and Double Density modes. *Extensive experience of the usage of disc drives suggests that the JAPANESE drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.*

Various other "manufacturers" of disc drives for the BBC micro (more accurately, "packages" label other manufacturers drives with their own name). We buy the high quality JVC and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.

If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.

Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate (extensive tests within our workshops have confirmed this). All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. Ideal for Schools & Colleges. We are now able to supply all single disc drives with Power Supply, in either single or dual case. (Dual case has a twin data cable and a power supply capable of driving two disc drives) allows easy expansion to a dual drive unit, at a later date. Prices stated in the pricing boxes below are for single drives in standard single cases. Single drives in a dual case cost an extra £5. (At Watford we anticipate your needs of tomorrow, not just today)!

When using a BBC Micro, most people find themselves short of desk space. The Watford's BBC Micro plinths form an ideal way of recovering some of this precious space) your BBC, Disc Drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. With the Watford Double plinth, your Disc Drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen, paper, reference manuals, etc. Follow the trend with Watford plinth. (Turn to the 6th page of our advert for the Plinths).
P.S. All our 5¼" Disc Drives with PSU are compatible with the Compact Micro. All you require is the special Compact Disc Drive Cables designed by us.



Capacity	Drives without P.S.U.		Drives with P.S.U.	
	Single	Twin	Single	Twin
200K (360K)	CLS 200 £95		CS 200 £108	
400K (720K)	CLS400S £96	CLD 400 £180	CS 400S £109	CD400 £200
800K (1.44M)		CLD 800S £183		CD 800S £204

● TWIN Disc Drive Case, complete with Power Supply & Cables **£43**
Securicor carriage on Disc Drives £5 to £6

Prefix ***C*** *= Cased Drive*
L *= Less PSU*
S *= Single*
D *= Double*

Suffix ***S*** *= 40-80 Switchable*

e.g. CLS400S = Cased drive, Less power supply unit, Single 5¼" 400K unit, (720K in double density); Double sided; 40/80 track switchable.

Cable to connect 5¼" Disc Drives to BBC Compact
Single £9 Twin £12
Special Cable to connect both 3½" and 5¼" Disc Drives simultaneously to the BBC Compact £13

3M – DISKETTES

3M – SCOTCH Diskettes with Lifetime warranty from Watford Electronics your 3M Appointed Distributor.

- *10 × 5¼" S/S D/D 40 Track Diskettes* **£9**
- *10 × 5¼" D/S D/D 40 Track Diskettes* **£11**
- *10 × 5¼" S/S D/D 80 Track Diskettes* **£13**
- *10 × 5¼" D/S D/D 80 Track Diskettes* **£13**
- *10 × 5¼" 1.6M D/S D/D High Density Discs for IBM XT and AT* **£28**
- *10 × 3½" S/S D/D 40/80 track Discs* **£18**
- *10 × 3½" D/D D/D 40/80 track Discs* **£22**

TOP QUALITY 3½" & 5¼" DISKETTES

To complement the range of quality discs and disc drives that WE already sell, WE are now supplying some special offer packs of 10 high quality discs. Each Disc has a reinforced hub ring and carries a lifetime guarantee. These are supplied complete with selfstick labels and packaged in an attractive plastic library disc box to protect them from damage. We strongly recommend these Discs.

DON'T SETTLE FOR LESS, BUY THE BEST

- *10 × **M3** 3½" D/S D/D 80 Track Discs* **£18**
- *10 × **M4** 5¼" S/S D/D 40 Track Discs* **£7**
- *10 × **M5** 5¼" D/S D/D 40 Track Discs* **£9**
- *10 × **M7** 5¼" D/S D/D 80 Track Discs* **£11**
- *3" Double Sided Discs* **£3** *each*

Special BULK OFFER on 5¼" DISCS

(Supplied packed in Anti-Static Lockable Storage Units)
(Lifetime warranty on Discs)

BULK PACK DISCS in lots of 100

Type	S-S 40T	D-S 40T	D-S 80T
● Without Sleeves	£39	£43	£65
● With Sleeves	£43	£45	£68

ACORN WINCHESTER DRIVES

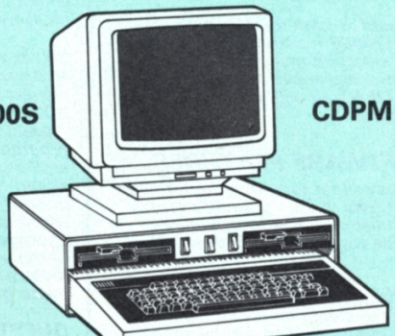
Supplied complete with Level 3 Econet File Server software.
10 Megabytes **£1050; 30 Megabytes £1549**

PRICES SLASHED

WATFORD's WINCHESTER DRIVES

- 10 Megabyte Unit with ADFS **£399**
- 20 Megabyte Unit with ADFS **£499**
- 40 Megabyte Unit with ADFS **£999**

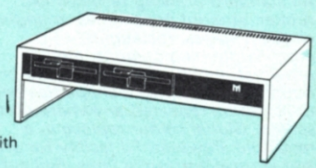
CDP 800S **CDPM 800S**



Twin 800K Double sided 40-80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC Micro. Supplied complete with integral power supply, cables and Utilities disc. The switches are mounted on the front panel for ease of use.

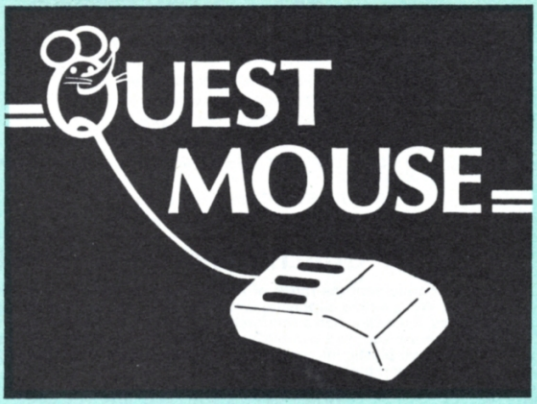
CDP 800S for BBC Micro £204 **CDPM 800S for Master £210**
(Securicor Carr. £7)

ACORN'S Twin 800K Disc Drives



Specially mounted side by side in a Master Plinth. Supplied complete with Cables. Plugs directly to the Master Computer.

RRP ~~£250~~ **Our Price: Only £189** (carr £7)



QUEST MOUSE

The ultimate in Mouse technology, the Watford Electronics Quest Mouse must be the most powerful Mouse package yet produced for the BBC Micro. Featuring state of the art 32K ROM software the Quest Mouse package is filled with features essential to the budding artist. The Quest Mouse is a high precision, low profile and large footprint mouse. It has three large comfortable buttons and is smooth and easy to use on most work surfaces. The Quest Mouse is FULLY HARDWARE COMPATIBLE with the AMX MOUSE so that programs such as AMX Pagemaker etc, will work with it.

The two parts of the Quest package are available separately so that existing Mouse owners can upgrade to the Watford's sophisticated Quest Paint software or replace their existing worn out mice for a minimum cost.

QUEST PAINT

The Quest Mouse software is supplied on a PALPROM unit to allow the sophisticated 32K program to be used from a single ROM socket. It is compatible with the BBC B, BBC B Plus and BBC Master Series machines.

The software is used to draw high resolution Mode 1 pictures in full colour. All menu selection and control of the drawing process is performed with the mouse so that you will hardly ever touch the keyboard.

SOFTWARE FEATURES

The software is far too powerful for us to describe it fully in such a small space. Below is a list of the various features. Please write to us for a fully descriptive leaflet.

Disk interface not required. Utilities disk has facility to create and print big screens. Colours applied can be solid, either pattern of user defined pattern. Drawing can use brush or airbrush. Brush shapes can be defined and stored. Airbrush sprays colour/pattern randomly with four jet sizes and even or center spread. Colour cycles. Colour protection to stop particular colours from being overwritten by selected drawing actions. All standard drawing facilities like: rubber, straight pencil lines, triangles, circles, ellipses, rectangles, parallelograms, polygons, etc are provided. All shapes can be solid or just a boundary line. Once a shape has been set up it can be repeated anywhere on the screen. Global colour replace in a rectangle. Powerful fill facility for areas and vertical/horizontal lines. Full cut and paste of rectangular areas with rotation and size with screens from Watford Beeb Video digitiser. Load and Save screens with colour pallet information, save brush and pattern definitions etc.

Take The Guesswork Out of Selecting a Mouse Package
With reviews like this how can you go wrong.

Popular Computing Weekly, 9-11 June '87
"What you actually get for your money is a well built, three button mouse (far superior to the AMX mouse)."
"Overall the combination of a quality mouse and decent art package gives Watford Electronics a real chance of supplanting AMX as mouse supremos."

Micro User June '87
"Quest Mouse and Quest Paint can hold their heads high in the market. . ."

A&B Computing June '87
". . . Watford Electronics, a company famed for excellent hardware add ons and versatile software packages. Called Quest mouse, "this is a very special mouse driven drawing package. . ."

". . . you will have one of the most comfortable and professionally built mice I have used in a long time. The buttons are responsive, the mouse movement is smooth and without directional bias – a pleasure to use."

"What we have here is probably the best art package there is for the BBC Micro . . ."
"Quest Paint is a major leap forward in BBC programming. . ."
"Quest Paint is an original piece of programming, it is friendly and well endowed with many useful facilities. I would comfortably say it is easier to draw good pictures with Quest Paint than it is with more expensive 'Professional' art packages for the Atari ST and the Commodore Amiga. A recommended buy if you are looking for the best in BBC micro based art packages".

QUEST MOUSE & QUEST PAINT	***£59***
QUEST MOUSE ONLY	***£30***
QUEST PAINT SOFTWARE	***£34***
QUEST FONT DISC	***£12***

N.B.
1. Quest Paint supplied complete with Software in a 32K ROM, Comprehensive User Guide and a Utility Disc.
2. Quest Font Disc has 24 text FONTS for use within Quest Mouse.
P.S. There is no need to worry about any of your existing AMX mouse software. The Quest Mouse is totally AMX compatible so it will work with any of the AMX range of software.

All prices in this advert are exclusive of VAT.

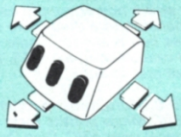
MARK II LIGHT PEN + PENPAL 2

Our Mark II Light Pen is the very latest in light pen technology. It is totally insensitive to local lighting conditions and works with many different monitors. The pen only responds to the High Frequency light produced by your monitor/TV. An LED indicates when valid video data is being produced. A conveniently located switch is also fitted.
Penpal II, Watford Electronics' sophisticated light pen software is also supplied free on cassette or disc (please specify). This is a highly sophisticated drawing package enabling you to gain the maximum benefit from your Light Pen. The software is used to edit Mode 2 full colour screens using lines, patterns and you own designs. Screens may be saved to cassette or disc.

Price Only £18

CREDIT CARD 24 HOUR
Ansaphone Hot Lines
(0923) 50234 or 33383

THE AMX MOUSE



Now supplied with the NEW SUPERART Software ROM & Disc at no extra cost.

ONLY: £59 (carr £1.50)
(Please specify for BBC or Master Computer)

We are giving away, absolutely **FREE**, our popular Colour Art software package worth **£15** with every AMX Mouse package purchased from us.

AMX MAT	**£5**
AMX MOUSE ONLY	**£29**
AMX DESK Package	**£19.00**
AMX UTILITY Package	**£11.00**
AMX SUPERART Package	**£39**

AMX PAGE-MAKER Pack – A desk--top publishing software. It Works with keyboard, joystick and a mouse **Only: £32**

We are giving away, absolutely FREE, PAGE-FONTS, a disc containing over 20 fonts, with every purchase of AMX PAGE-MAKER from us.

PAGE-FONTS Over 20 fonts for use with AMX PAGE-MAKER **£9.50**

EXTRA EXTRA	**£19**
AMX DESIGN (ROM)	**£69**
AMX 3D ZICON Disc	**£19**
AMX Database Disc	**£19**
AMX XAM Educational	**£19**
AMX MAX A gem of desktop (ROM)	**£17**

RB2 MARCONI TRACKER BALL

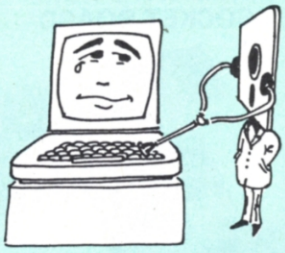
Complete with Software Disc	**£59**
RB2 + Software Disc + Quest Paint	**£85**

FLEET STREET EDITOR

Software pack **£35**

Admin Xtra Disc Utility	**£13**
Walt Disney Disc Utility	**£13**
Fonts N Graphics Disc Utility	**£13**

DIAGNOSTICS DISC



The BBC Micro is a very complex machine and thus diagnosing a fault can be very difficult. At Watford Electronics, we realise how difficult it can be when faced with a problem, finding yourself a long way from your nearest dealer, or even just uncertain about your Beeb's health, but not wanting to waste time and money taking it to be looked at.
The solution to these problems is here now, in the form of the Watford's Diagnostics Disc. This excellent utility is specially designed to test out the following areas of your Beeb:
RAMs, ROMs, ULAs, Sound, Keyboard, Disc, RS423, ADC, User Port, Printer Port, Cassette, Joysticks, Speech, Disc Drives, 6502 and Z80 2nd Processors.
This utility is an invaluable aid for all those who take the reliability of their system seriously. A comprehensive manual provides full operating details and a list of possible causes and remedies for any faults that you may find along the way. The package also enables a permanent equipment and service record to be maintained.

Only £20.00

BBC SOFTWARE'S Popular Educational Software

- Maths with a Story 1 (Cassette). 4 primary level maths programs **£9.95**
- Maths with a Story 2 (Cassette) 4 further maths programs **£9.95**
- Picture Craft (Disc) 6 - 14 age group. Pack consists of flexible geometrical design & colouring programs **£19.95**
- WAVES: Science Topics (Disc) CSC O Level Physics program. **£14.95**
- RELATIONSHIP: Science (Disc) O Level Biology program. **£14.95**
- BONDING: Science (Disc) O Level Chemistry program. **£14.95**
- ELECTROMAGNETIC SPECTRUM (8 Discs) O Level program. **£14.95**
- ELECTRONICS IN ACTION (Disc) O Level program **£14.95**
- NEWTON & THE SPACE SHUTTLE (Disc) O Level program. **£20**
- ECOLOGY (Disc) O Level program. **£20**
- POLYMERS (Disc) O Level program. **£20**
- Clasification & Periodic Table O Level. The suite is supplied with its own database of chemical elements which can be classified according to your own rule. **£20**
- FOOD & POPULATION (Disc) O Level program. **£20**
- MICROTECHNOLOGY (Cassette) O Level program. **£6.95**
- A VOUS LA FRANCE (2 Cassettes) A French language home study aid. **£17**
- DEUTSCH DIREKT! (Disc & Audio Cassette) **£20**
- Modem Master (Disc) **£11.25**
- ADVANCED TELETEXT SYSTEM **£6.90**
- PERIOD TABLE SOFTWARE **£20**
- USING YOUR COMPUTER (Cassette) 8-12 age **£24**

TED

The Teletext Editor Package for serious users

TED is the brand new package from Watford Electronics for the editing and creation of teletext (Mode 7) screens and displays. TED is ideal for anyone wanting to create their own Mode 7 pictures (such as game title pages), designing animated displays for shop windows, exhibitions, classrooms, etc. TED is also probably the most powerful Prestel screen editor you will ever come across.
Supplied on a special 32k package, full facilities are providing for manipulating the screen, including easy to use pixel manipulation; line, column and block buffering and copying; left and right margins; large text in a variety of different fonts (contained within the ROM device); various borders and effects templates (contained within the ROM device); line and column insertion and deletion; easy to use graphics line drawing. Those are some of the features of editor itself. In addition to this, TED contains routines for taking a number of Teletext screens and creating them into an animated sequence, with user selectable display times, repeats on a group of shows, various entry methods (how the picture is put onto the screen), routing selection (both predefined and keyboard specific), chaining of other shows, etc. Scrolls treat the Teletext sequence as a very long page with a window onto it. Supplied complete with a comprehensive manual. There are many more facilities not mentioned here, so write in for a comprehensive leaflet; you'll wonder how you managed without TED.

Price: £35

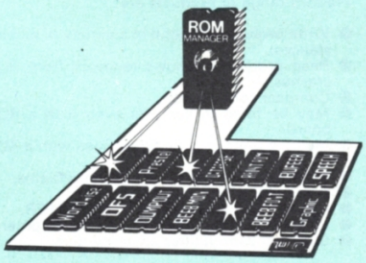
ROM-SPELL

Probably the most advanced and fastest spelling checker available for the BBC Micro. Compatible with View, Wordwise and Wordwise Plus ROMSPELL is simple to use with easy editing of incorrect words. Full facilities for editing the user dictionary to allow customisation to your personal needs. Dictionary includes over 30,000 words and is supplied with a Comprehensive manual.

NOT compatible with 1770 DFS.
(Please state 40 or 80 track disc)

Price still only: £25

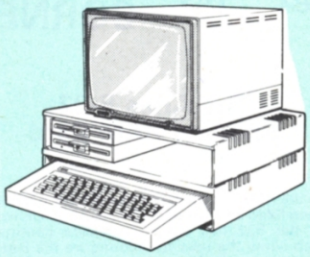
ROM MANAGER



Take control of your Sideways ROMs with ROM Manager. This powerful utility ROM gives you power over your sideways ROMs. Disable whole ROMs, send commands directly to named ROMs and many other powerful facilities.
"Provides comprehensive management of all your installed ROMs". (BEEBUG November '84.)

ONLY £20

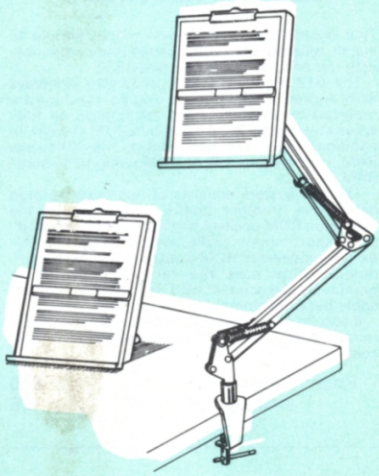
PLINTHS FOR BBC MICRO, MASTER & PRINTERS



Protect your computer from the weight and heat of your monitor. The BBC micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and monitor, whilst the double height version provides enough room for our stacked or side-by-side dual disc drives or TORCH Disc pack, to be placed in the centre section. If you use our stacked drives, the remaining space can be used for further peripherals e.g. Speech Synthesizer, EPROM programmer or simply stationery. The computer slides neatly in to the lower section allowing easy access to remove the lid. The printer plinth is equally sturdy but without the cooling slots. It allows for access to the paper from the front as well as from the rear, (a facility not often thought of in similar products) if the paper is located beneath the plinth. This is a very convenient way to work especially if your work area is not deep enough to take the printer and paper separately.

SINGLE BBC PLINTH	**£11** (carr. £1.50)
DOUBLE BBC PLINTH	**£20** (carr. £2.00)
PRINTER PLINTH	**£10** (carr. £1.50)
SINGLE MASTER PLINTH	**£14** (carr £1.50)
DOUBLE MASTER PLINTH	**£25** (carr £2.00)

COPY HOLDERS



How often have you been about to type hand written notes into your computer when you find that there's nowhere to rest the paper or that your notes are resting at the wrong angle to read the type? Whether the notes be your latest program or the draft of a new trilogy, the new Manuscript Holders from Watford are superb for holding your paper at the ideal height and angle to allow you read and type in ease and comfort.
Available in 2 versions, desk resting and shelf clamping versions, these two units hold your paper firmly by means of a plastic retaining ruler and a clip grip.

Amazing value at only
Desk Top **£10** (carr. £2)
Angle poise **£14** (carr. £3)

Continued

ARIES CORNER

The Aries B-32 Shadow RAM Card

Like the BBC B+, the B32 provides 20k of shadow screen RAM and 12k of sideways RAM. Unlike the B+, the B32 has simple software commands which allow the user to reconfigure the RAM as 16k of shadow RAM and 16k of sideways RAM, or all 32k as sideways RAM.

With the B32, the programmer gets up to 28k of RAM available for Basic, Logo, Comal, Forth, Lisp and BCPL programs in any screen mode. The business user gets extra memory for View, ViewSheet, Wordwise Plus, Interword and many other applications. For advanced applications, the scientific user gets access to a massive 47k of data storage using the Acorn approved *FX call.

Sideways RAM enables you to load sideways ROM images from disc, allowing you to have a large library of sideways ROMs (subject to the copyright holder's permission) stored on disc. The B32's sideways RAM can also be used to extend any operating system buffer (such as the printer buffer) or to load tape programs into a disc system.

The B32 simply plugs into the 6502 processor socket on your BBC micro – no flying leads to connect and no soldering. Provision of the on-board ROM socket means that the Aries-B32 control ROM does not use up one of your existing ROM sockets.

Price: **£80** (carr. £2(

Aries B-12 Sideways ROM Board

This board is extremely well made, simple to install, reliable when fully loaded and compatible with the Aries-B20 and the Aries-B32

The B12 provides a total of twelve sideways ROM sockets (the four in the original machine are replaced by the twelve on the board), all fully accessible by the MOS sideways ROM system. In addition, there are two sockets for sideways RAM, giving up to 16k of RAM using 6264 static RAM chips.

The B12 system consists of two parts: a large detachable "mother board" which carries the extension ROM sockets and a small "base board" on a short ribbon cable, which plugs into the existing sideways ROM sockets. This two-board design eliminates the reliability problems previously associated with some other ribbon-cable based systems.

If you do not have a B32 or B20, a small adaptor module (the Aries-B12C) is available at a nominal cost.

Price: Aries B-12 **£40**
Aries B-12C **£5**

ARIES B-488 IEEE-488 INTERFACE UNIT

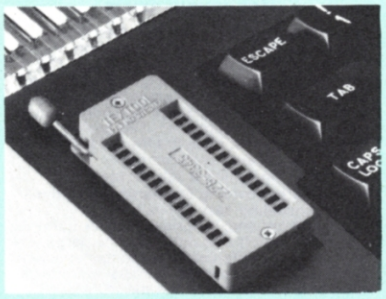
The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB' or 'HP-IB') is the standard method of interconnecting programmable laboratory instruments and control equipment. Using the B488, up to 15 devices may be connected in a single high-speed data network.

£238 (Carr £3)

GRAPH PAD 2

Supplied complete with Software
£60 (Carr. £3)

SIDEWAYS ZIF SOCKET



Allows you to change your ROMs quickly and efficiently, without opening the lid. The ZERO INSERTION FORCE (ZIF) socket is located into the ROM Cartridge's position.

- Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.
- The low profile of the socket allows unrestricted access to the Keyboard.
- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.
- This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for all professionals and Hobbyists alike.)
- BBC, B+ and Master compatible.

ONLY **£15** (carr £2)

Low Profile CARTRIDGE SYSTEM

Complete System consists of: Low profile ROM Cartridge, Socket housing, Cable assembly, 5 labels and a library storage rack.

- Complete System **£11**
- Spare Cartridges **£2.50**
- Spare Rack **£1.50**

16K Sideways RAM Modules

Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.
Key points to note about this new addition to the Watford range of products are:

- Write protection (useful in a variety of circumstances).
- Read protection (allows recovery from ROM crashes).
- Compact construction.
- May be fitted in systems even with a ROM board.
- Multiple units may be fitted, even with a ROM board.
- No overheating or overloading problems.
- Free utilities disc supplied.
- Can be used as a 16K PRINTER BUFFER.
- Ideal for professional software development.
- Supplied with utilities software disc.

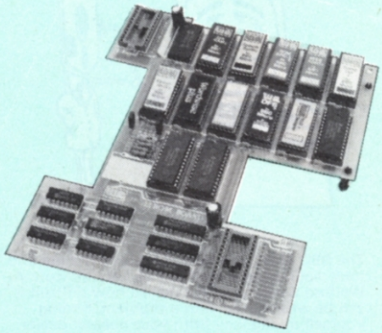
Only: **£24** (carr £2)

Optional extras

READ and WRITE protect Switches **£2** each
Battery for Battery Backup **£3**

All prices in this advert are exclusive of VAT.

SOLDERLESS SIDEWAYS ROM SOCKET BOARD



In the May 1986 Micro User's independent review, the writer concludes, "The board has been well laid out. Its position is much better than others – not over the HOT RAM chips and further away from the disc controller area". "I give the solderless ROM board the thumbs up and wish it success".

This brand new board from Watford Electronics is designed specifically for those wishing to add a ROM board to their own BBC without the need to perform any soldering.

This new board expands the total possible number of ROMs in a BBC from 4 to 16.

Unlike our competitors inferior boards, the ONLY upgrade required for fitting battery backup to the Watford Solderless ROM board (all Watford ROM boards, actually) is the fitting of the battery itself. (No other expensive components are required.)

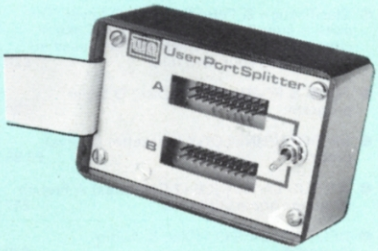
- The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:
- Increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 takes two 6264 RAM chips.
- Read protect to make RAM "Vanish") allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only £32
Battery backup fitted **£36**
(carriage £2)

- Sideways RAM Utilities Disc for Solderless ROM Board. Includes the options to load and save ROM Images and the facility to use Sideways RAM as Printer Buffer.

Only: £8

USER PORT SPLITTER UNIT

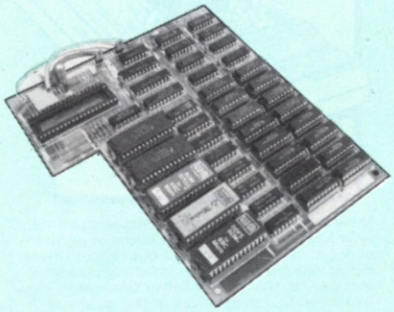


Gone are the days when you had to plug and unplug devices from the User Port. This extremely useful little device allows two units to be connected to the User Port simultaniously, and select between them simply by toggling a switch. This device is particularly useful for those people using Quest Mouse and the Watford Video Digitiser or any similar combination.

Excellent Value at **£15**

Watford ROM/RAM CARD

A must for all serious users



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 3 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO overheating problems.
- No User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Firm mounting in BBC micro.
- Compatible with all BBC micros (not BBC+ or Master).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of Battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- Accepts any ROM.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE Fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROMSPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM-RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM-RAM Board.

The ROM-RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, for later.

Please write in for further details.

INTRODUCTORY PRICES:

- *ROM/RAM card with 32k dynamic RAM* **£39**
- ROM/RAM card with 64k dynamic RAM **£52**
- ROM/RAM card with a massive 128k dynamic RAM **£80**

(carriage on ROM-RAM Card £3)

OPTIONAL EXTRAS:

- *16k plug-in Static RAM kit* ..... **£?**
- *16k Dynamic RAM for Upgrade* **£7.50**
- *Battery backup* **£3**
- *Read and Write protect switches* ..... **£2** *each*

Complete ROM-RAM board (all options installed) **£89**

Le Modem

The MODEM from Watford

At last a professional MODEM for the BBC Micro. Unlike other 'Modem packages' this is a complete package there are no extra software costs to get 'up and running'. Of course Le MODEM is multi-standard, i.e. 300/300, 1200/75 & 75/1200 UK and BELL (USA) are all supported.

The features that make Le MODEM such good value are:

- *A complete communications terminal that transforms your BBC Micro into a very powerful World-wide data transfer system.*
- *Auto Dials, Auto answers, and is completely controlled by your micro. There are no external controls!*
- *Allows you to access PRESTEL, B.T. GOLD, THE SOURCE, MICROLINK, MICRONET, MICROWEB, THE TIMES NETWORK, MICRO LIVE (BBC TV database), CITY BB and more.*
- *Designed to be SIMPLE but SOPHISTICATED. To LOGON to a data base all you have to know is its TELEPHONE NUMBER, Le MODEM does the rest.*
- *Supplied with a comprehensive telecomms package in a 16K sideways ROM which includes a FULL PRESTEL terminal allowing TELESOFTWARE to be downloaded.*
- *A comprehensive 80 column terminal. This includes XMODEM error checked transfer protocol, to allow error free data transfer anywhere in the world!*
- *FULLY controlled by simple '*COMMANDS allowing you to control it from your own BASIC programs. To get you started we supply a FREE disc of bundled software!*
- *Connects to the 1MHz bus. A *AUDIO ON-OFF command allows you to actually hear the telephone line through your BBC micro loudspeaker.*
- *Completely self contained with internal mains power supply. (Even a free mains plug is fitted!) A *TEST facility gives ON SCREEN indication that Le MODEM is working correctly.*
- *Packaged in such as way that you need nothing else except a BBC Micro to communicate with computers all over the world.*
- ***FREE Registration to MicroLink.***
- *BT Approval applied for.*

(When ordering, please specify the version required, (BBC or Master)

SPECIAL OFFER

Price: **£74** (carr £3)

(Price includes, Le Modem, Software ROM, Cables & Comprehensive Manual)
(Write in for further details)

Nightingale Modem

SPECIAL PRICE to our Customers

£82

(Price includes: Nightingale Modem, Commstar ROM pack & Comprehensive manual)

Nightingale Modem without software **Only £75**

COMMSTAR ROM package only **£29**
(P&P on modem £3.00)

APOLLO

The NEW Modem from Watford

Following numerous requests from you, our discerning customers for an APPROVED, Low Cost & High Performance modem with Auto Dial & Auto Answer facilities as standard) we bring you the versatile APOLLO Modem. Just compare the features and look at the price (which incidentally includes the cost of the Software, manual and BBC connecting cable). We are sure you will agree that Watford Electronics in their traditional way are giving you a super 'value for money' deal.

Just look at these features:

- V21 for Bulletin boards, Microlink, Telecom Gold, etc.
- V23 for Prestel, Home Banking, and other Viewdata services.
- Reverse V23 allows User run Viewdata service.
- 1200-1200 half duplex for communications.
- XMODEM, HEX and ASCII file transmission.
- Auto Dial of given 'phone number.
- Auto Answer for User's Bulletin Board.
- 80 column terminal with split screen facility.
- Prestel text screen dump.
- Fully BABT approved.
- **FREE Registration to MicroLink.**

The Apollo is attractively finished in matt black. It opens the doors to world communication to both, the Hobbyist and the Professionals alike. With baud rates varying from 300/300 Originate and Answer, 1200/75 and 75/1200 full duplex and 1200/1200 half duplex, virtually all the popular tele-services can be accessed. A comprehensive Comms ROM oversees the use of the APOLLO, providing simple commands for all the software controlled facilities. APOLLO is an ideal modem for both the first time buyer and the seasoned user. Join the Telecommunications Revolution – Buy a Watford APOLLO!

Only: **£75** **(Carr £3)**
(Write in for full specification)

BT TELEPHONE CONNECTORS for Modems

LJU 1/4A Mini Line Master	**£4.50**
LJU 1/6A Mini Line Slave	**£3.00**
LJU 2/4A Line Master	**£4.00**
LJU 2/6A Line Slave	**£2.50**
LJU 3/4A Flush Master	**£3.95**
LJU 3/6A Flush Slave	**£2.75**
LJU 10/3A Dual Splitter	**£5.50**
4 Way BT Plug	**£0.75**

Versatile BEEB SPEECH SYNTHESISER Unit

The Watford Speech Synthesiser is a very flexible speech synthesis unit based upon the powerful phonemes system. This system stores the building blocks of speech (called phonemes) and allows you to combine them quickly and easily to form virtually any word imaginable.

Supplied with an advanced ROM, you are provided with a 500 word dictionary to get you started. These can easily be added to by following the notes given in the comprehensive manual.

SPECIAL PRICE £32 (carr £2)

Continued

COMPUTER CONCEPT'S ROMS

ACCELERATOR	£48
CARETAKER Basic Utility	£25
DISC DOCTOR	£28
Graphics ROM	£23
TERMI	£25
COMMUNICATOR	£49
SPEECH ROM	£24
Printmaster	£24

Wordwise £24

Wordwise plus

WORDWISE PLUS £40

We are giving away absolutely **FREE,** the superb Word-Aid ROM worth £24, with every WORDWISE PLUS package bought from us.

Word-Aid

The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear text-segment area.
- BBC B, B+ and Master compatible.

Only **£24**

(N.B. Word Aid requires a Disc Interface in your Micro)

HI-WORDWISE-PLUS DISC: £5

SPELL MASTER £47

Inter SHEET ONLY £37

INTER:CHART ONLY: £26

Inter-WORD

Only: **£39**

INTERBASE £59

All Prices Exclusive of VAT

VIEW

VIEW WORDPROCESSOR 2.1	£37
VIEW 3.0 ROM	**£54**
VIEW PROFESSIONAL	**£85**
HI-VIEW (for use with 6502 2nd Processor)	£36
VIEW Printer Driver Generator (Please specify Disc or Cassette)	£9
VIEWSHEET (Acornsoft)	£37
VIEWSTORE	£37
VIEWSPELL with 80 track disc	£29
VIEWPLOT Disc (Please specify for Master 128 or Compact)	£22
VIEW-INDEX	£12
OVERVIEW Packs 1 & 2 for the Master	£85

Watford's own Sophisticated VIEW PRINTER DRIVERS

Epson FX80 & Kaga KP (Disc)	£8
Juki & Brother HR15 (Disc)	£8
Silver Reed Printers (Disc)	£8

Micros in Business (Disc)
An introduction to Business software for the BBC Micro from Acorn £43

ADVANCE COMPUTER PRODUCTS' ROMs

Adv. Disc Toolkit	£29
Adv 1770 DFS for Mast/Compact	£29
Adv 1770 DFS for BBC/BBC+	£29
Adv Disc Investigator	£24
Adv. Control Panel	£29

MINI OFFICE II

Disc Version	£14.50
ROM Version	£48.00

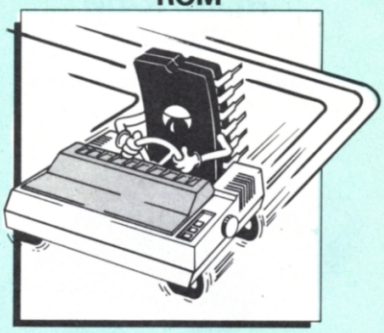
REPLICA 3

This new improved REPLICA 3 from Clares is a very powerful disc based TAPE to DISC Utility. It now transfers even more programs than ever before. Replica 3 will not work with all programs but then neither will anything else. 30,000 Replicas have been sold to date. It has to be good.

£13 (40 or 80 track)

Acorn's Speech Synthesiser package, complete
Special Offer £18

VIEW PRINTER DRIVER ROM



View is a powerful word processor, but until now has seriously lacked in terms of printer support. With the launch of our Printer Driver ROM, which includes an extremely powerful and easy to use Printer Driver Generator, View users can find themselves in the realms of advanced word processing only at a small outlay.

The VPD extends View's printer command with a series of mnemonic commands. All standard highlight sequences are also supported. A large range of printers are supported by drivers contained within the ROM (the drivers can be downloaded and customised). Printers supported include: Epson's MX, RX, FX, FX, LX, JX80 range, HI80, KP810/910, PW1080, JP101, HR15, M1009, GLP, JUKI 6100, etc.

Other printers are readily supported by defining a Printer Driver using the built in Printer Driver Generator. The features mentioned below are available to both the built in Printer Drivers and user defined drivers (assuming the printer supports the features).

NLQ control, Underline, Bold, Proportional Spacing, Microspacing, Italic, Superscript, Subscript, Condensed, Enlarged, Double Strike, Set lines per inch numerically (e.g. LPI 6), Set characters per inch numerically (e.g. CPI 5), Select printer font, Select printer ribbon colour, Translation sequences, Emulation of BBC Character Set, Simple numeric expressions for certain operations, Full printer setup, Send control codes, Print prompt on screen, Redefinable Pad character, Pause for key press, Prompt to change daisywheel, and Execute * command when printing.

Other features include a very powerful on screen preview, with bold, italic, underline, super/subscript, enlarged highlights, and a special printer driver to allow memory based text to be previewed by View 1.4. Of course, View 1.4, 2.1 and 3.0 are all supported, as is Shadow RAM and 6502 Second Processors. The BBC B series and Master series of micros are supported. A comprehensive manual is supplied. All in all, a very professional product for the discerning user who wants power at their finger tips. (Write in for a detailed leaflet).

Price: Only £33

Harness the full potential of your Epson RX or FX printer. The NLQ ROM makes Epson printers produce Near Letter Quality output with optional proportional spacing, enlarged and underlined. Accessed by simple * commands from Basic, Wordwise and View (with driver) or almost any other language.

(Send an SAE for sample printout)

Only: £25

VIEW PRINTER DRIVER for NLQ ROM £7

DUMPOUT 3

A highly sophisticated screen dump ROM. This has to be the most flexible and powerful screen dump ROM yet produced for the BBC micro. It will put on paper anything you see on the screen, including full Mode 7 graphics. Also provided are window setting utilities and OSWORD calls to plot and read Mode 7 graphics pixels.

Facilities:

- *Vertical and horizontal scaling in all graphics modes and mode 7*
- *Rotation of image by 90, 180 or 270 degrees*
- *Left hand margin setting*
- *Screen dump window setting*
- *Colours appear as grey scale*
- *Two tone fast dump*
- *Colour mask*
- *Mode 7 contrast expansion*
- *Mode 7 contiguous dump*
- *Key triggered and User Port triggered dumps*

The Micro User Feb. 1985.
'Without reservation I wholeheartedly recommend the Dump Out 3 ROM as the ultimate screen dump facility for the BBC Micro . . . it must represent excellent value for money and surely cannot be beaten".

For use with the following printers:

GLP, GP80/100/250, CANNON, STAR, KAGA/ TAXAN, NEC, SHINWA CP80, GEMINI, EPSON MX/RX/FX, M1009, NEC PC8023, DMP100/200/ 400, Panasonic KX1080, Mannesman Tally and compatibles.

Only: £25

(Write in for further details on all above ROMS)

THE EUREKA CARD

(The Unique RAM Expansion System)

The Eureka Card is Watford's latest and most sophisticated RAM expansion system. Using advanced PAL based technology this card is a breakthrough in RAM systems for the BBC micro. The Eureka Card provides the user with around 58K of free memory in Basic, VIEW and WORDWISE PLUS. You also get Shadow RAM from within the active language. No other RAM expansion system can match that!

Load up to 58K long Basic programs. Texts in VIEW and WORDWISE PLUS up to 58K as well. This with absolutely NO loss of speed in accessing your text or program. Eureka consists of a card containing 64K of program memory, two parallel banks of sideways RAM and some extremely complex switching circuitry. This is all controlled by Eureka's highly sofisticated software supplied in ROM. Designed to a very high specification, this board is fully buffered to give reliable operation under virtually any circumstances.

The Eureka board plugs into the 6502 socket and has NO messy flying leads. It is compatible with many other products from Watford, such as our Solderless ROM Board and our ROM/RAM Board. All in all, the Eureka Card is an amazing board. Jump into the age of serious data processing with a Eureka Card! Please write in for further details 'on advantages the Eureka can offer you'.

Introductory price: Only **£89** (carr £3)

(P.S. Eureka is only suitable for a standard model B; it normally replaces any Shadow RAM cards present. Some speed degredation does occur with filing system access. Eureka cannot be used at the same time as a second processor).

BEEBMON

The most powerful machine code monitor for the BBC Micro **£24**.

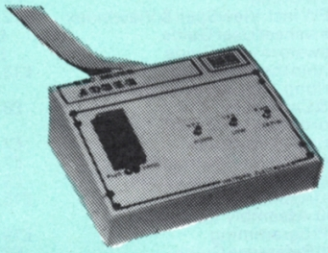
THE NLQ DESIGNER

(The First & still the Best)
Supplied with over 25 Different fonts

A massively useful utility for users of the Taxan/Kaga KP810/910 or the Canon PW1080. This program allows you to define NLQ character sets to download into the printer's memory. Full on screen editing of the font. Requires 6264 RAM chip to be fitted in the printer.
Supplied with disc containing over 25 example fonts. Please specify 40 or 80 track. Fonts are: Italic, Courier, Courier Italic, Script, Copper Plate, Shadow, Bold, Double Print and Gothic etc. (P.S. This ROM is not suitable for Epson printers.)

- *NLQ Designer ROM & FONT Disc* ***£25***

ADDER



Adder is the ultimate EPROM programmer for the BBC Micro. It will program many different EPROMs up to the very latest 27256 32K devices.
The Adder unit connects to the User Port and draws its power from there too. The EPROM is mounted in a top quality ZIF socket. There are no switches or controls as Adder is entirely software controlled.
The Adder software provides sophisticated facilities for programming EPROMs from a RAM image produced by loading disc files. The software is menu driven and designed for ease of use.
Features:

- Two ultra fast programming algorithms or standard slow algorithm.
- Supports standard 21V programming and newer 12.5 volt EPROMs. (Software switched).
- The RAM image to be programmed can be built up in many ways. Sections of image can be loaded separately. Part programming. Read EPROM. Edit data in memory.
- Automatic processing to handle a list of files to program into the EPROM.
- Automatic disc buffering to allow programming of 32K 27256 devices from a 32K file without extra effort.
- Verification gives detailed error list and checksums are maintained. There is also a blank check facility.
- Works with all standard filing systems. Generates header code for RFS ROMs to allow Basic programs etc. to be stored in EPROM. More than one file per ROM permitted.
- Programs the following EPROMs: From 2K to 32K: 2516, 2716, 2532, 2732, 2764, 2764A, 27128, 27128A, 27256 (Both 12.5V and 21V).

£65 (£3 Carr)

TEX EPROM ERASERS

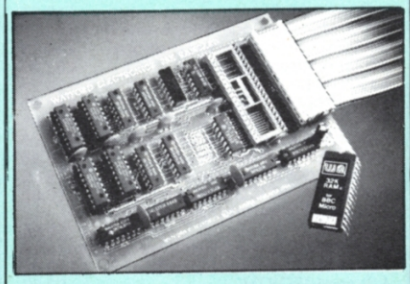
EPROMs need careful treatment if they are to survive their expected lifetime. Over erasure of EPROMs very rapidly turns them into ROMs! The TEX erasers operate following the manufacturers specifications to give the maximum possible working life by not erasing too fast. We use these erasers for all our own erasing work.

- **ERASER EB** – Standard version erases up to 16 chips. **£28** (carr £2)
- **ERASER GT** – Deluxe version erases up to 18 chips. Has automatic safety cut-off to switch off the UV lamp when opened. **£30** (carr £2)
- Spare UV tubes. **£9**

32K

SHADOW RAM- Printer Buffer

Expansion Board



A MUST FOR WORD PROCESSING

Watford Electronics now brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. Don't throw away your BBC B for a BBC B Plus or BBC Master. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16K or even 20K, but a massive 32K of extra RAM!!!

- IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.

- "VIEW" Wordprocessor users can now type in letters in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.

- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24K of text in memory. This product is recommended as an ideal complement by Computer Concepts.

- Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20K of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28K of program space.

- Use the FULL 32K or the bottom 12K of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS423 etc. Print large text files while running long graphics programs, and have all your buffer options available as well (*FX15,21,138,145,ADVAL etc). Please note only a 12K printer buffer can be used with Wordwise or Wordwise-Plus, due to the way they are written.

- Unique facility to turn ROMs off and on again. Unlike all other ROM managers, this feature does not use 'unofficial' memory. Two bytes of normally user-inaccessible memory on the RAM card are used to ensure ROMs are disabled WHERE OTHER ROMS FAIL.

See next page for SPECIAL OFFER

Only £59 (carr £2)

(Price includes a comprehensive manual and the ROM)

INCREDIBLE WORDPROCESSING DEAL

Watford's 32K SHADOW RAM CARD and Computer Concept's INTERWORD Wordprocessor package.

at Only **£89** (carr £2)

Continued ——→

BOOKS (No VAT on Books)

30 Hour BASIC (BBC Micro)	£7.95
40 Best machine Code Routines	£7.95
50 Programs in BBC BASIC	£6.95
6502 Assembly Language Program	£19.95
6502 Application	£11.95
6502 Assembly Lang. Subroutines	£19.95
6502 Development Package	£7.50
6502 Reference Guide	£9.95
68000 Assembly Lang. Programming	£19.95
68000 Machine Code Programming	£13.00
68000 Microprocessor Handbook	£14.95
68000 Programming the	£22.95
68000 User Guide	£8.95
6809, Programming the	£16.95
6809 Machine Code Programming	£7.95
8086/8088 Assembly Language Prog.	£11.95
8086/8088 Programming the	£16.95
Advanced Disc User Guide	£16.95
Advanced BASIC ROM User Guide	£9.95
Advanced Programming Guide to BBC	£9.95
Advanced Sideways RAM User Guide	£10
Advanced User Guide for BBC	£10.95
Advanced FORTH	£9.95
Advanced Graphics with BBC	£9.95
Assembly Language Programming on BBC Micro	£11.50
Adventure into BBC BASIC	£6.95
Applied Assembly Lang. for BBC	£9.95
Art of Microcomputer Graphics	£14.95
Assembly Language Programming FOR the BBC Micro	£8.95
Assembly Language Programming on the BBC & Electron	£8.95
Basic ROM User Guide	£11.95
BBC B Compendium	£5.95
BBC B+ User Guide	£14.95
BBC BASIC for Beginners	£7.95
BBC Forth	£7.50
BBC Hardware Projects	£8.95
BBC Micro & the small Business	£5.75
BBC Micro ROM Book	£10.95
BBC Master 128 for High Flyer	£10.95
BBC Micro Disc Companion	£8.95
BBC Software Projects	£6.95
BCPL User Guide	£14
BCPL The Language & its Compiler	£7.95
C for Beginners	£10.95
C for Programmers	£9.95
Complete FORTH	£6.95
Computer Graphics & CAD fundamentals	£9.95
CP-M - 86 User's Guide	£19.95
CP-M Bible	£16.50
CP-M Handbook with MPM	£9.95
CP-M Plus Handbook	£13.95
CP-M Soul of	£16.50
CP-M The software BUS	£8.95
Creative graphics on BBC Micro	£7.50
Disc Drive Projects for Micros	£5.45
DISC FILING SYSTEM (DFS) Operating Manual for BBC	£6.95
DBASE Programming Language	£14.95
Disc Programming Techniques	£9.95
Exploring FORTH	£6.95
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Graphs & Charts on BBC Micro	£7.50
Hackers Handbook - New	£6.95
Inside Information (Computers, Interfacing & Control o/t BBC Micro	£9.95
Communications & People)	£8.95
Interfacing & Robotics on BBC	£15.95
Introduction to COMAL	£9.50
Introduction to LOGO	£6.95
Introducing 'C'	£9.95
Introducing LOGO	£5.95
Introduction to FORTH	£8.95
Introduction to PASCAL	£17.95
ISO - PASCAL Reference Manual	£9.95
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LISP, A Beginners Guide to	£10.95
LISP on the BBC Micro	£7.50
LISP the Language of Artificial Intelligence	£9.95
Logo on the BBC Micro	£7.50
Logo Programming	£9.95
Mysteries of DISC DRIVES and DFS REVEALED	**£5.95**
Mastering Assembly Code	£8.95
Mastering CP-M	£17.95
Mastering Music	£6.95
Mastering the Disc Drive	£7.95
Master Advance Reference Manual	£19.95
Master Reference Manual Part 1	£14.00
Master Reference Manual Part 2	£14.00
Mastering View, Viewsheet & Mathematical Progress in BBC Basic	£7.95
Micro Prolog	£10.00
Microtext for the BBC	£10.00
Viewstore	£12.95
Points of View	£6.95
Practical Disc File Techniques	£5.95
Programming the 6502	£16.95
Programming the Z80	£19.95
Structured Basic	£7.95
The Epson FX-KAGA PRINTER Commands REVEALED	**£5.95**
The Software Business	£5.50
Toolbox 2	£10.95
Towers Int. Transistors Selectors	£12.95
Turtle Graphics on BBC Micro	£7.50
Understanding FORTH – A Beginner's Guide	£6.50
Understanding Interword – A Beginners Guide	£6.50
View 3.0 User Guide	£10
View Guide	£4.50
VIEW incl. ViewSpell & ViewIndex	£12.95
Viewsheet User Guide	£10
Viewstore User Guide	£10
Within the BBC Micro	£13.95
Writing Interactive Interpreters & Compilers	£8.45
Wordprocessing BBC Beginners Guide	£7.95
Wordstar & CP/M made easy	£7.45
Wordwise + A User Guide	£9.95
Z80 Applications	£15.95
Z80 Assembly Language Programming	£19.95
Z80 Reference Guide	£9.95

OFFICE MASTER

CASHBOOK – A complete "Stand Alone" accounting software package for the cash based sole trader/partnership business. It is designed to replace your existing cashbook system and will provide you with a computerised system complete to trail balance.

FINAL ACCOUNTS – Will take data prepared by the Cashbook module and produce a complete set of accounts as following: Trial Balance with inbuilt rounding routine; Notes to the accounts; VAT Summary; Profit & Loss A/C; Balance Sheet.

MAILIST – A very versatile program. Enables you to keep records of names and addresses and then print, examine, sort and find them, all with special selection techniques.

EASILEDGER – A management aid software tool designed to run alongside an existing accounting system. Essentially a Debit/Credit ledger system which can handle sales, purchase and nominal ledger routines to provide instant management information.

INVOICES & STATEMENTS – Greatly reduces the time and cost of preparing Invoices and Statements by storing essential information like customer names, addresses and account numbers. Has VAT routines and footer messages facility.

STOCK CONTROL – Allows you to enter stock received, stock out, summary of stock items and current holdings together with details of total cost, total stock to minimum level, units in stock ordering, quantity and supplier detail.

All this for only **£21** (Disc)

OFFICE MATE

- DATABASE
- BEEBCALC SPREADSHEET
- BEEBPLOT GRAPHICS

DATABASE – Set up a computerised card index system with powerful search facilities.

SPREADSHEET – Offers many calculation and editing features.

BEEBPLOT – Provides visual representation from Spreadsheet data.

OFFICE MATE Only £10 (Disc)

BEEB VIDEO DIGITISER

Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro.

This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket.

Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem.

The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.

Both the black and white levels can be adjusted manually for the optimum picture, or switched to automatic for unattended use. The image produced can be reversed if necessary.

Full controlling software is supplied on a normal sideways ROM and this is easily accessed via additional * commands. The package is designed to allow easy input of complex screens and give full access of the data to the user. Once on the screen, the image can be used as a normal graphics screen, allowing any of the usual graphics commands in BASIC or other ROM's to work on it.

A special print dump routine is included with the driver programs. This is specially designed to produce a fast, correctly proportioned picture, with reduced "contouring", resulting in an accurate reproduction of the original image.

Detailed examples of driving this unit from BASIC or other languages are all provided in the extensive manual supplied.

£109 (Carr. £3)

(Price includes) Digitiser Unit, Software in ROM & a Comprehensive Manual)
(BBC B+ and Master compatible, except Master with Econet)

Magazine Maker

(As seen on TV)

A combination of the AMX Pagemaker and Watford's Beeb Video Digitiser.

Using any video that provides a composite signal and the digitiser, images from a camera or TV can be converted into a graphics screen on the BBC Micro.

They can then be used within AMX Pagemaker to illustrate magazines or newsletters – in fact anything that needs to be created on A4 size paper.

With Pagemaker's many features, a variety of pictures can be composed – the only limit being the imagination.

Pictures can be doctored using Pagemaker's graphics option to produce any number of effects.

Text can be formatted around the digitised photo on screen using the facilities available, which include 16 typefaces, character and pattern definer, text formatting and the ability to load in wordwise and viewfiles plus much more.

Once created the picture can be printed out.

The Magazine Maker is suitable for any use that requires illustrated documents.

Complete Package **£129.00** (carr. £3)

VOLTMACE JOYSTICKS

Delta 3B Single Joystick	£12
Delta 3B Twin Joysticks	£17
Delta 3C Joystick for Compact	£10
Delta 14B Single Joystick	£12
Delta 14B/1 Adaptor Module	£12
Transfer Software Disc-Tape	£7

ROM EXTRACTION TOOL

This extremely useful tool allows you trouble free chip removal from your computer by distributing the removal force over the whole body of any 24 or 28 pin chip.

£2

ACORN MUSIC 500

BBC B, B+ & Master compatible.

You too can acquire this music package that has already thrilled thousands, for:

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Cambridge Computer Store, 4 Emmanuel St., Cambridge CB1 1NE. Tel: 0223 358264.

Cirkit Distribution Ltd, Park Lane, Broxbourne, Herts.

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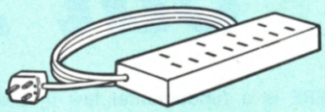

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Stepping out . . .

Mike Cook shows how to measure up to a map

THERE is a fundamental law in computers and electronics that says: "If a job seems easy it will be difficult, if it seems difficult it will be impossible". This month's project appeared easy, but as we shall see it was not quite so easy.

It started with a plea to measure a route on a map and I was asked if I could make an automatic measuring device? "Simple", I said, "What you need is a one dimensional mouse – a pedometer".

Well it might be simple in theory, but implementation was a little trickier. What we need is an incremental shaft encoder, this generates pulses in response to a shaft turning.

A quick look through the catalogues told me that it was going to be an expensive operation.

Most incremental shaft encoders work optically, the shaft being coupled to a slotted disc which breaks a beam and produces a pulse.

If you have two beams arranged so that when one beam is broken the other is complete then the two pulses produced will be 90 degrees out of phase. In this way you can work out the direction of rotation. Figure I shows the basic idea.

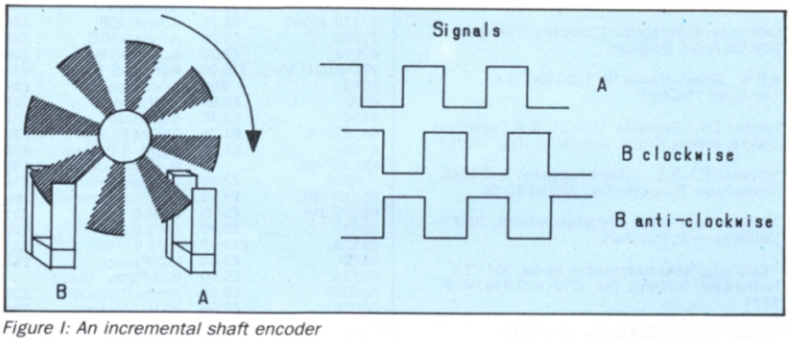

Figure I: An incremental shaft encoder

Incremental shaft encoders are specified by the number of pulses they produce per rotation. Of course the more pulses per rotation (ppr) the more accurate any measurement will be. As you have guessed, the more pulses per rotation the more expensive the incremental shaft encoder is.

Top of the range is the Hewlett-Packard digital potentiometer giving 256 pulses per revolution but at £73.60 it is quite a price. Next, Mullard make one giving 128 pulses per revolution at £46. Salvation is at hand, however, for the low cost end of the market as Alps produce one giving 50 pulses per revolution at £7.

Unfortunately the cheap one has a great disadvantage. While the other two operate optically and produce logic signal outputs, the Alps is a moving contact device. This means that the signal is formed by moving a spring contact over a printed circuit-like patterned conductor and the patterns produce the pulses.

When you try to use this directly you find that contact bounce produces ragged edges giving rise to false triggering. In order to use it the signal has to be cleaned up with a pair of Schmitt triggered gates.

This is shown in Figure II. The capacitors on the input delay the signal sufficiently to remove the false contacts. Note that this circuit is not needed with any of the more expensive optical switches.

In order to turn these incremental shaft encoders into pedometers we need to add a handle to the body and a wheel to the shaft. This is shown in Figure III and this is where your ingenuity comes in.

I used a wheel from a model construction set and made the handle by gluing a metal bar to a piece of aluminium. The

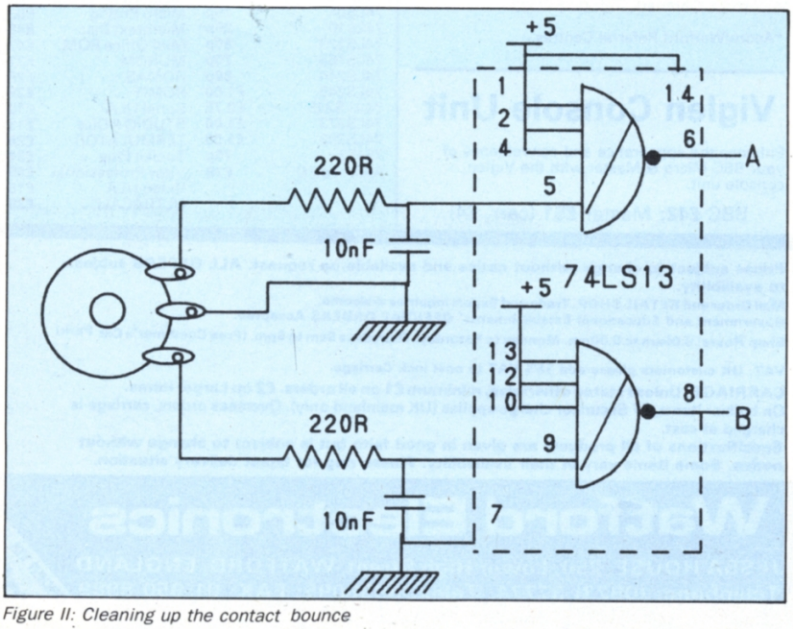

Figure II: Cleaning up the contact bounce

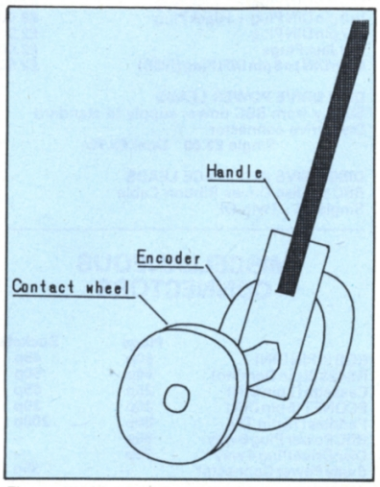

Figure III: Making the pedometer

THE BEEB BODY BUILDING COURSE

smaller you make the wheel the better you will be able to follow curves. But remember you need to make it large enough to clear the shaft encoder's body. The really mechanically minded can use a small wheel and gears to give more sensitivity. I have not tried this, but the general idea is shown in Figure IV.

Now, how can we count the pulses? Well, the simplest way is to use the VIA's timer T2 in count down mode. This is a 16 bit counter that is decremented on a falling edge on bit 6. Figure V shows how you can wire this up and Listing I shows the software needed to drive it.

Note that we are only using one of the two outputs from the incremental shaft encoder and as such will only be able to count in one direction.

The program gives a display of both the raw count and a scaled value, which can be reset by pressing the space bar. The scale factor is defined in line 160 and is quite easy to calculate for any application.

Suppose you want to make measurements on a map. Measure the scale bar at the bottom of the map with the pedometer and make a note of the number of raw pulses, then divide this number by the number of miles with which this corresponds.

Use this figure to set the variable *S* in line 160. You can expand this simple program to make use of several different scales. Then the calibration procedure can be part of the program and the scale factors stored in a disc file.

In some applications you will want to increase a count when travelling in one direction and decrease it when travelling in the other. In this case we can use the same sort of software that is used by a mouse. This works by generating an interrupt on one edge of the incremental shaft encoder's pulse and using the other signal to decide whether we are going clockwise or anti-clockwise.

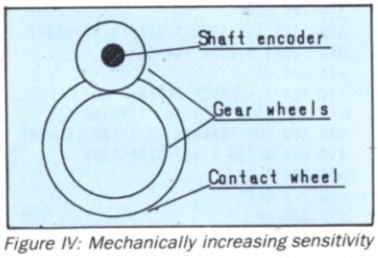

Figure IV: Mechanically increasing sensitivity

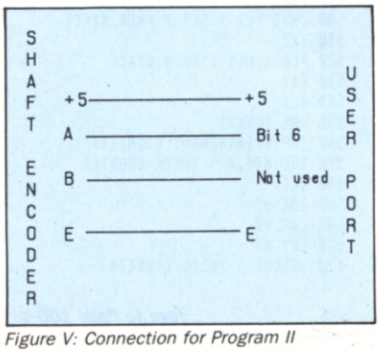

Figure V: Connection for Program II

The way this is wired up is shown in Figure VII. By feeding the same signal into CB1 and CB2 we can generate an interrupt on both edges of the pulse and double the resolution of the system.

Using interrupts however does present a problem. If the interrupts arrive fast enough we may not have time to process one before the next arrives.

This is no problem when using a mouse, as a missed pulse here and there will make no difference to the feel of the unit. But when every pulse counts any missing ones will affect the accuracy of the measurement.

While we can't stop the computer from missing pulses we can detect when they are missed. If we keep a separate check count for rising edge interrupts and falling edge interrupts the difference between them should not be greater than one.

If it is it shows that some pulse has been missed. Note that this is not a cast-iron method of detecting missing pulses as it could show that the same number of rising and falling edges have been missed. In practice, however, I have found that it catches all errors. If an error is made try again, only more slowly. Listing II shows the code to perform this task.

Most of the program is an interrupt service routine that looks at level of the B pulse and decides whether to increment or decrement. The check counter is

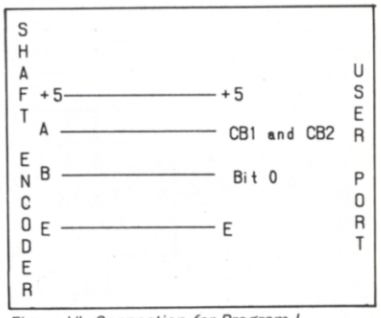

Figure VI: Connection for Program I

a single byte stored at &70 and &71 whereas the true count is a four byte value stored from &74 to &77.

Again the scaling procedure is the same as the previous program with the scaling factor being held in line 920. Note that as this is an interrupt driven procedure the counters will continue to be updated even when the program is not running.

This makes it easy to write your own program interact with the counters by simply using the ? operator to look at the appropriate memory location.

The only snag with the last program is that it is prone to indicate errors especially when working fast. Well when software fails call up the hardware.

What we need is a hardware counter, like the one in the VIA, but this time one that can count up and down. The 74LS191 counter seems to fit the bill as it has both count and direction inputs and is well suited to the task.

The direction input, however, can only be changed when the clock is high. Therefore we have to put one of our pulses through a monostable to ensure that it is normally high and only pulses low briefly on a falling edge.

Figure VII shows how this can be done, note that two 74LS191s can be connected to make up an 8 bit counter.

The output from the counter is read by the user port and the difference between

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44a) HP 256 p.p.r. digital shaft encoder £73.60
44b) Mullard 128 p.p.r. incremental shaft encoder £46.00
44c) Alps 50 p.p.r. incremental shaft encoder £7.00

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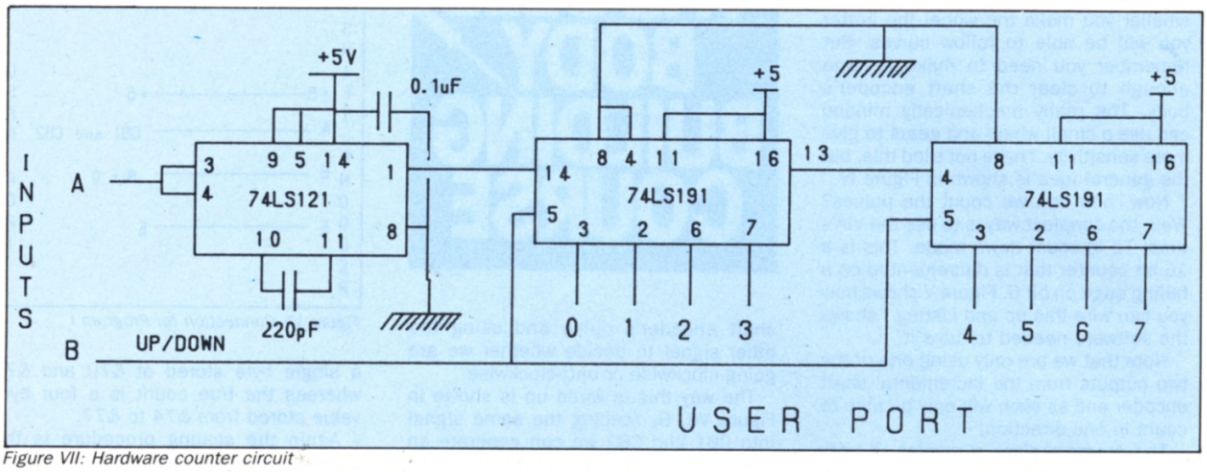

Figure VII: Hardware counter circuit

◀ *From Page 97*

the current count and the previous count is noted. The software to do this is shown in Listing III. This system will cope with up to 127 pulses between updates and, although this updating is done in Basic, it is more than adequate.

The major difficulty in writing the software is coping with when the counter "wraps round". This is done by restricting the difference to 8 bits with the AND operation and assuming if the counter difference is greater than 127 then the count must have decremented.

As there are so many options in this month's project I have not made any printed circuit boards. The shaft encoders are, however, available as Body Build Pack No. 44, using the order form.

The easiest way to connect up to the user port is to use Body Build Pack No. 1.

This is a simple transition board that allows you to make screw connection to the user port. This is connected to the computer by a ribbon cable and two sockets available as Body Build Pack No.2.

So now precision measurements of linear distances are possible. Happy pedding. See you next month.

Listing I

```
  100 REM PEDOMETER SOFTWARE 1
  110 REM By Mike Cook
  120 REM (c) The Micro User
  130 *KEY10 OLD|M
  140 MODE1
  150 CLS
  160 PRINT
  170 PRINT"BEEB BODY BUILD"
  180 PRINT"SEPTEMBER  1987"
  190 PRINT"By Mike Cook"
  200 PRINT
  210 PRINT"Pedometer 1 software "
  220 PRINT
  230 PRINT"Press SPACE BAR to clear rea
ding"
  240 ?&FE6B=&20 : REM T2 COUNT DOWN
  250 PROC_CLEAR
  260 S=1.45 : REM SCALING FACTOR
  270 REPEAT
  280 A%=(!&FE68) AND &FFFF
  290 D%=R%-A%
  300 R%=A%
  310 C%=C%+D%
  320 SV=C%*S
  330 PRINT TAB(0,12);"RAW PULSES ";C%;S
PC(5)
  340 PRINT TAB(0,15);"SCALED VALUE ";SV
;SPC(5)
  350  IF INKEY(-99) THEN PROC_CLEAR
  360 UNTIL FALSE
  370 END
  380 DEF PROC_CLEAR
  390 PRINT TAB(0,12);SPC(20)
  400 PRINT TAB(0,15);SPC(20)
  410 ?&FE68=&FF
  420 ?&FE69=&FF
  430 R%=&FFFF
  440 C%=0
  450 ENDPROC
```

Get it right!

100 = 0 0	220 = FF3E 4	340 = 72E8 0
110 = 0 0	230 = 49D6 5	350 = DB3A 1
120 = 0 0	240 = 6AB7 0	360 = 226C 3
130 = BE57 7	250 = 96EF B	370 = FD2E 7
140 = EA3A A	260 = 3822 C	380 = 21 4
150 = 7A16 4	270 = BFBA 2	390 = BB52 8
160 = FF3E 6	280 = 2D5B E	400 = 7C4A A
170 = 2EC6 4	290 = DB34 3	410 = D6C1 2
180 = A0F4 A	300 = 1774 B	420 = 7C90 B
190 = FC23 4	310 = FF72 2	430 = 9E0D C
200 = FF3E C	320 = F939 E	440 = DDEC 4
210 = E984 4	330 = 9468 5	450 = ED0F B

Listing II

```
  100 REM PEDOMETER SOFTWARE 2
  110 REM By Mike Cook
  120 REM (c) The Micro User
  130 *KEY10 OLD|M
  140 MODE1
  150 CODE%=&A00
  160 FOR A=0 TO 3 STEP 3
  170 VECT=&80
  180 P%=CODE%
  190 [
  200 OPT A
  210 PHA \SAVE ACC
  220 TYA
  230 PHA \ SAVE Y REG
  240 TXA
  250 PHA \SAVE X REG
  260 LDA &FE6D \ INTERRUPT FLAG REG
  270 AND #&18 \ SEE IF IT IS CB1 OR CB2
  280 BEQ NUS \ BRANCH IF ITS NOT US THE
IRQ WANTS
  290 PHA \SAVE INTERRUPT FLAGS FOR LATE
R
  300 AND #&8 \ TEST FOR CB2
  310 BEQ VERT \ IF NOT LOOK AT CB1
  320 LDA &FE60 \ SEE WHICH DIRECTION
  330 LDX #0
  340 ROR A \ GET DIRECTION INTO CARRY
  350 BCC SK1
  360 JSR UP
  370 JMP VERT
  380 .SK1 JSR DOWN \ DECREMENT COUNT
  390 .VERT \ LOOK FOR CB1
  400 LDX #1
  410 PLA \ RECOVER FLAGS
  420 AND #&10 \ IS CB1 FLAGING
  430 BEQ NUS \BRANCH IF THERE IS NONE
  440 LDA &FE60 \ GET DIRECTION
  450 ROR A
  460 BCS SK2
  470 JSR UP
  480 JMP NUS
  490 .SK2 JSR DOWN
  500 .NUS PLA \ GET X FROM STACK
  510 TAX
  520 PLA \ GET Y FROM STACK
  530 TAY
  540 PLA
  550 JMP (VECT)
  560 .UP \ INCREMENT COUNTERS
  570 INC &70,X \ CHECK COUNTER
  580 CLC
  590 LDA #1
  600 LDX #0
  610 LDY #4
  620 .ILOOP \ PULSE COUNTER
```

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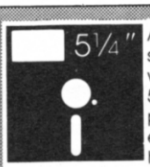

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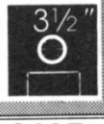

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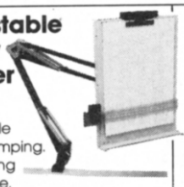

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132 Column Version
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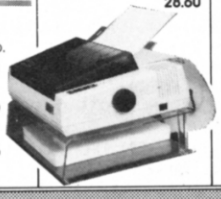
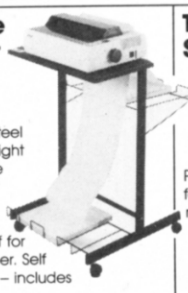
28.60



Mobile Printer Stand



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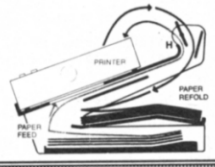

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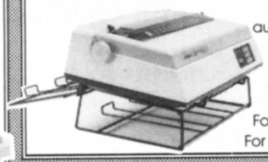

MD 100

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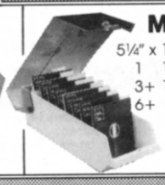
3+ 10.30 each
6+ 9.80 each



MM 40

3½" x 40
1 8.30
3+ 7.90 each
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1 10.95
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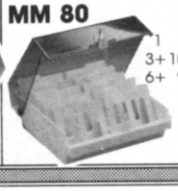
6+ 9.90 each



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◀ From Page 98

```
  630 ADC &74,X
  640 STA &74,X
  650 LDA #0
  660 INX
  670 DEY
  680 BNE ILOOP
  690 RTS
  700 .DOWN \ DECREMENT COUNTERS
  710 CLC
  720 LDA &70,X \ CHECK COUNTER
  730 SBC #0
  740 STA &70,X
  750 CLC
  760 LDX #0
  770 LDY #4
  780 .DLOOP
  790 LDA &74,X
  800 SBC #0
  810 STA &74,X
  820 INX
  830 DEY
  840 BNE DLOOP
  850 RTS
  860 ]
  870 NEXT
  880 CLS
  890 PRINT
  900 PRINT"BEEB BODY BUILD"
  910 PRINT"SEPTEMBER  1987"
  920 PRINT"By Mike Cook"
  930 PRINT
  940 PRINT"Pedometer 2 software"
  950 PRINT
  960 PRINT"Press SPACE BAR to clear rea
ding"
  970 PROC_VECTOR_SWAP
  980 ?&FE62=?&FE62 OR &FC
  990 ?&FE6C=&10 : REM INTERRUPT ON EACH
 EDGE
 1000 ?&FE6E=&98 : REM ENABLE INTERRUPTS
 1010 PROC_CLEAR
 1020 S=1.45 : REM SCALING FACTOR
 1030 REPEAT
```

THE BEEB BODY BUILDING COURSE

```
 1040 A%=?&70
 1050 B%=?&71
 1060 C%=!&74
 1070 SV=C%*S
 1080 PRINT TAB(0,12);"RAW PULSES ";C%;S
PC(5)
 1090 PRINT TAB(0,15);"SCALED VALUE ";SV
;SPC(5)
 1100 T%=A%+B%
 1110 E%=ABS(A%-B%)
 1120 IF E%>1 AND E%<255 THEN PRINT"ERRO
R"
 1130  IF INKEY(-99) THEN PROC_CLEAR
 1140 UNTIL FALSE
 1150 END
 1160 DEF PROC_VECTOR_SWAP
 1170 IF (?&206=CODE% MOD 256) AND (?&20
7=CODE% DIV 256) THEN ENDPROC
 1180 ?VECT=?&206
 1190 ?(VECT+1)=?&207
 1200 ?&206=CODE% MOD 256
 1210 ?&207=CODE% DIV 256
 1220 ENDPROC
 1230 DEF PROC_CLEAR
 1240 PRINT TAB(0,12);SPC(20)
 1250 PRINT TAB(0,15);SPC(20)
 1260 PRINT SPC(20)
 1270 !&70=0
 1280 !&74=0
 1290 ENDPROC
```

Listing III

```
  100 REM PEDOMETER SOFTWARE 3
  110 REM By Mike Cook
  120 REM (c) The Micro User
  130 *KEY10 OLD|M
  140 MODE1
  150 CLS
  160 PRINT
  170 PRINT"BEEB BODY BUILD"
  180 PRINT"SEPTEMBER  1987"
  190 PRINT"By Mike Cook"
  200 PRINT
  210 PRINT"Pedometer 3 software "
  220 PRINT
  230 PRINT"Press SPACE BAR to clear rea
ding"
  240 ?&FE62=0
  250 PROC_CLEAR
  260 S=1.45 : REM SCALING FACTOR
  270 REPEAT
  280 A%=?&FE60
  290 D%=(A%-R%) AND &FF
  300 R%=A%
  310 IF D%>&80 THEN C%=C%-(256-D%) ELSE
 C%=C%+D%
  320 SV=C%*S
  330 PRINT TAB(0,12);"RAW PULSES ";C%;S
PC(5)
  340 PRINT TAB(0,15);"SCALED VALUE ";SV
;SPC(5)
  350 IF INKEY(-99) THEN PROC_CLEAR
  360 UNTIL FALSE
  370 END
  380 DEF PROC_CLEAR
  390 PRINT TAB(0,12);SPC(20)
  400 PRINT TAB(0,15);SPC(20)
  410 R%=?&FE60
  420 C%=0
  430 ENDPROC
```

This is one of hundreds of programs available FREE for downloading on

MicroLink

In addition to these many BBC Micro programs in the MicroLink library will also run on the Electron.

Get it right!

```
100 =    0 0 | 300 = EC3E E | 500 = 9ED2 A
110 =    0 0 | 310 = 9CF7 D | 510 = 670E 4
120 =    0 0 | 320 = 6988 8 | 520 =  768 A
130 = BE57 7 | 330 = EA45 D | 530 = 772F 2
140 = EA3A A | 340 = 8B4F 1 | 540 = 4E8A F
150 =  BBF 5 | 350 = 21D1 6 | 550 = 434A A
160 = 46C5 8 | 360 = A2D8 8 | 560 =  AF7 2
170 = 4C46 2 | 370 = FE39 E | 570 = 8400 D
180 = BFA1 6 | 380 = DCB9 2 | 580 = 74FB 8
190 = EB9E 5 | 390 = 6972 F | 590 = 12B4 0
200 = DDA7 0 | 400 = FA64 A | 600 = EA45 3
210 = DBA8 1 | 410 =  768 E | 610 = DC75 D
220 = 6ECC E | 420 = BB22 4 | 620 = 45FC 3
230 = DBA8 3 | 430 = E6CB 3 | 630 = 44C7 F
240 = 5DFD D | 440 = 6988 E | 640 = 8C09 A
250 = DBA8 D | 450 = 856E F | 650 =  295 9
260 = AD15 9 | 460 = 15E8 6 | 660 = 7602 4
270 = 328B C | 470 = A2D8 E | 670 = F888 4
280 = E6CB F | 480 = B5FD E | 680 = 8E1D 9
290 = DBA8 0 | 490 =  190 7 | 690 = 9843 F
```

```
700 = 4648 F | 900 = 2EC6 2 | 1100 = EBFB 0
710 = 74FB D | 910 = A0F4 B | 1110 = 9B9A 0
720 = 264E 6 | 920 = FC23 D | 1120 = 7ECA E
730 = FDFF B | 930 = FF3E D | 1130 = DB3A C
740 = 50C9 B | 940 = 7E11 2 | 1140 = 226C B
750 = 74FB 6 | 950 = FF3E B | 1150 = FD2E 9
760 = EA45 3 | 960 = 49D6 E | 1160 = 7385 C
770 = DC75 8 | 970 = CCD0 B | 1170 = ACA7 D
780 = 7AF0 A | 980 = EC43 E | 1180 = 3C6C 5
790 = 7A17 7 | 990 = C3B6 2 | 1190 = 8A09 2
800 = FDFF 1 | 1000 = C493 1 | 1200 = D7DA B
810 = 8C09 6 | 1010 = 96EF A | 1210 = D63A 5
820 = 7602 5 | 1020 = 3822 0 | 1220 = ED0F D
830 = F888 0 | 1030 = BFBA 0 | 1230 =  21 5
840 = AF67 7 | 1040 = 5820 2 | 1240 = BB52 B
850 = 9843 5 | 1050 = 9083 0 | 1250 = 7C4A 7
860 = 8B58 5 | 1060 = C1BA 5 | 1260 = 81CB 1
870 = 2C83 8 | 1070 = F939 D | 1270 = 4862 D
880 = 7A16 D | 1080 = 9468 D | 1280 = 94A2 4
890 = FF3E 6 | 1090 = 72E8 A | 1290 = ED0F D
```

Get it right!

```
100 =    0 0 | 210 = EF6E E | 320 = F939 D
110 =    0 0 | 220 = FF3E 2 | 330 = 9468 3
120 =    0 0 | 230 = 49D6 6 | 340 = 72E8 A
130 = BE57 7 | 240 = 6D2C C | 350 = DB3A 1
140 = EA3A A | 250 = 96EF B | 360 = 226C 5
150 = 7A16 4 | 260 = 3822 6 | 370 = FD2E 3
160 = FF3E 6 | 270 = BFBA 0 | 380 =  21 6
170 = 2EC6 4 | 280 = 3D2D 2 | 390 = BB52 6
180 = A0F4 A | 290 = DF46 8 | 400 = 7C4A 1
190 = FC23 4 | 300 = 1774 D | 410 = 4397 C
200 = FF3E C | 310 = 4ECC F | 420 = DDEC 9
                             | 430 = ED0F A
```

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Putting on the squeeze

In the third part of his series, Pete Gerrard gets the most text into the least memory

THIS month we're going to look at ways in which we can scrape a quart of text into a pint pot of memory. You can leave last month's parser in its box because we won't be needing it this time. Instead, a totally separate program is going to be developed, and we'll start by looking at what is needed.

One of the main functions of an adventure program is to inform the player of where he is in the game, or in other words, what location he has reached.

Part of the secret of writing good adventures is to make these location descriptions interesting and varied, so that the first time a player reaches a scene he will be told in some detail of where he is and what he can see there.

There is an art to doing this and you don't have to be a literary prize winner to succeed. For example one programmer might use this as his room description:

```
You are on a path in a forest that runs
past a few trees.
```

It tells the player where he is but it doesn't exactly set the screen alight with crackling prose does it? How about changing that to something like:

```
You are in a sparse deciduous forest,
following a path worn deep by the hooves
of countless horses.
```

Slightly longer, but infinitely more evocative of where the player is at the time.

In our adventure you'll be able to use even longer descriptions in fact as long as you want. Here's another example of what you can say when the player reaches the edge of your adventure:

```
You have reached the edge of the forest.
There is nothing in front of you.
```

This certainly tells the player that he can't go any further but the realism is lost. We might prefer something like:

```
The path leaves the forest and disap
pears into an endless plain of swaying
grass.
```

Again slightly longer, but it does seem better, and if the player tries examining the grass or stepping out into the endless plain – good luck to him, you can always add one more location which permanently loses him in the endless plains of grass.

So, a few points to bear in mind when conjuring up your location descriptions: First, don't use bland boring statements, be expressive. Don't be afraid of long descriptions, it won't do that much harm and fewer rooms with superb descriptions is better than a lot of boring rooms.

Don't do anything that might offend a woman playing a game you designed for a man, and vice versa. And do buy a thesaurus and a dictionary. You can use them to find new words and help you get your spellings right – there's nothing worse than an adventure with spolung mosteaks.

But long location descriptions must take up a lot of memory, and probably account for more memory than the rest of the program put together. So anything we do to save room is to be welcomed.

The first most obvious way of storing room descriptions is to have something like this:

```
10 REM Program I
20 READ maxrooms
30 DIM room_descr$(maxrooms)
40 FOR room=1 TO maxrooms
50 READ room_descr$(room)
60 NEXT room
70 REPEAT
80 REPEAT
90 INPUT"Which room",room
100 UNTIL room>0 AND room<=maxrooms
110 PRINT room_descr$(room)
120 UNTIL FALSE
130 DATA 3
140 DATA You are in the kitchen.
150 DATA You are in the hall.
160 DATA You are in the lounge.
```

The main disadvantage of this method is that the data is stored in memory twice: once within the program and once in the array – not good when we are trying to save space.

Several commercial programs bypass the array but keep the data in the Basic program by using this system:

```
0 REM Program II
1 DATA You are in the kitchen.
2 DATA You are in the hall.
3 DATA You are in the lounge.
1000 maxrooms=3
1010 REPEAT
1020 REPEAT
1030 INPUT"Which room",room
1040 UNTIL room>0 AND room<=maxrooms
1050 RESTORE room
1060 READ room_descr$
1070 PRINT room_descr$
1080 UNTIL FALSE
```

This works by setting the pointer that reads data from DATA statements to the appropriate line and then reading the data from that line.

While this removes the double copy of data it has several disadvantages. It is slow, the person playing the game can list it and find out what the rooms are, the descriptions are limited in length to that of a Basic line and most importantly the plain text still uses up a lot of space.

Even if the data is held on disc or tape

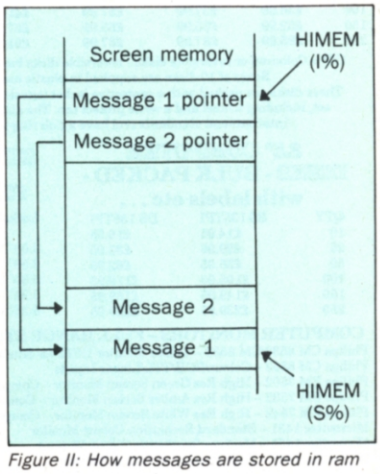

Figure II: How messages are stored in ram

as a separate file we use up 16k of ram with 255 bytes per room and just 64 rooms. So let's reject all these systems for something better.

Most room descriptions use the letters A to Z, numbers, space and some punctuation, which gives us a total of 43 characters.

Each byte of memory is equivalent to one character space since it takes one byte of memory to store one character, like the letter 'A', the digit '7' or the symbol '!'.

Up to 256 different numbers can be stored since each of the eight BInary digiTs – bits – in one byte can either be 1 or 0, this gives you 2^8 combinations which is 256.

Now the letter 'A' is represented by the number 65, try this:

```
PRINT ASC"A"
```

And the lower case letter 'a' is number 96. The lowest visible (sort of) character is the space which is number 32, and the highest keyboard character is ~ which is 126, (character 127 is delete).

This gives a total of 95 displayable characters out of 256 possibilities, and we only want 43. What we need is a method of compressing the text so that we get more than one character into every byte using a special coding technique.

Some letters and characters appear more frequently in text than others, and a frequency table of the ones we are going to use is shown in Table I.

The compression technique works like this: The 14 most frequent characters will be represented by the numbers 0 to 13 which can be held in half a byte, called a nybble, we'll call these characters Group 0.

The other characters will be divided into two groups each of which also occupies just a nybble each. Code 14 in the first nybble means use the next nybble as an index into Group 1a, and code 15 in the first nybble means use the next nybble as an index into Group 1b. These groupings are shown in Table II.

The end result is that the most frequent characters all occupy one nybble, half a byte, while the less frequent ones use two nybbles, a whole byte. Figure I shows how the words 'A table mat' would be encoded.

Notice that we use a special marker to indicate whether the next character is to be upper case – this does mean that an upper case Z would actually occupy two full bytes, one byte for the marker and one byte for the letter itself.

Using this method we can compress a piece of text to around 58% (or even better) of its original size. A reduction of this amount means that text that occupied 16k before compression would be compressed to 9.5k which is a considerable saving.

Now you know what the text compressor does you can move to Listing I which is the program itself in Basic. It is fairly short so should not present too many difficulties. The checksum is provided just in case.

To use the compressor you need to prepare a pure text file of each room description. You can do this with most word processors (not Interword). Just type in each room description ending each one with a Return.

Don't worry about word wrapping

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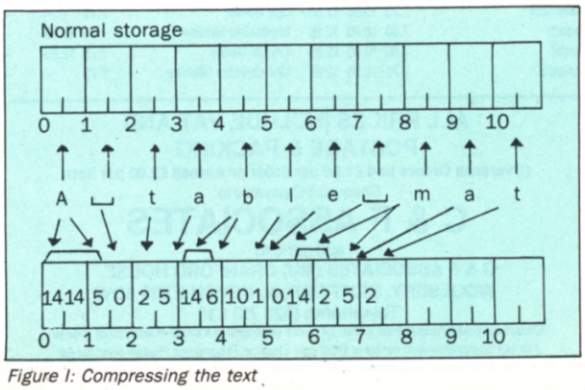

Figure I: Compressing the text

Char	Ascii	Number	Percentage	Char	Ascii	Number	Percentage
Space	32	817	17.83	f	102	89	1.94
e	101	406	8.86	m	109	76	1.65
a	97	320	6.98	b	98	53	1.15
o	111	304	6.63	p	112	52	1.13
t	116	298	6.50	w	119	49	1.06
n	110	269	5.87	Up Case	--	44	0.96
s	115	248	5.41	.	46	43	0.93
i	105	227	4.95	k	107	41	0.89
r	114	221	4.82	v	118	30	0.65
l	108	201	4.38	Return	13	20	0.43
h	104	181	3.95	,	44	15	0.32
d	100	156	3.40	q	113	6	0.13
u	117	150	3.27	'	39	2	0.04
c	99	106	2.31	z	122	2	0.04
y	121	101	2.20	j	106	1	0.02
g	103	96	2.09				

Table I: Character frequency

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◀ *From Page 103*

(stopping words getting split between lines) because the print routine will take care of that.

Figure II shows how each message is built from *S%* (HIMEM) upwards and a two byte offset index to the start of each message is built from *I%* (*himem*) downwards. The messages are saved as a file called *mess* and the indices are stored as *indx*.

Listing II is a simple decoding program using the routines that will be incorporated into the main program. As the index file only contains offsets from the start of the message file it doesn't actually matter where we put the messages in memory. We always know where to look for the start of each.

We could even put the data into sideways ram (you could get at least 115k of text compressed into 64k of sideways ram, enough for 450 different locations) – but unfortunately not everybody has it.

The printout speed is quite acceptable for an adventure game, since it draws a nice dividing line between appearing instantly and being printed so slowly that the player gets bored and wanders off somewhere.

So away you go, your developing map can now have some room descriptions started up – remember you can always add to and develop the descriptions as you go along. If you find the compression and expansion too slow then there are two extra programs on the monthly disc/cassette to generate machine code for compression and expansion of the text and run very much faster.

Have a good go at understanding how this works, if necessary try doing some encoding by hand, and produce a good number of your room descriptions. Next time we'll go into more detail on your vocabulary lists – and a lot of the objects will derive from your descriptions. Bye for now.

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Group 0	Group 1a	Group 1b
0 Space	0 p	0 0
1 e	1 w	1 1
2 t	2 m	2 2
3 o	3 g	3 3
4 n	4 y	4 4
5 a	5 f	5 5
6 i	6 b	6 6
7 r	7 v	7 7
8 s	8 k	8 8
9 h	9 x	9 9
10 l	10 z	10 !
11 d	11 j	11 ?
12 c	12 q	12 ;
13 u	13 '	13 .
14 Use Group 1a	14 Next letter upper case	14 ,
15 Use Group 1b	15 End of message	15 Not used

Table II: Character grouping

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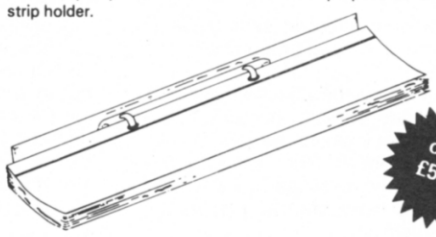

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THE LENTON BUSINESS CENTRE
LENTON BOULEVARD
NOTTINGHAM NG7 2BY
PHONE: 0602 787923

◀ *From Page 105*

Listing I

```
  100 REM   Text Encoding
  110 REM (c) The Micro User
  120 REM ==================
  130 MODE 7:himem=HIMEM:HIMEM=TOP+&400
  140 PROCinit:ON ERROR PROCerror:END
  150 PROCcomp:PROCsave:CLOSE#0:END
  160 DEF PROCerror:CLOSE#0
  170 ON ERROR OFF:PRINT:REPORT
  180 PRINT" at line ";ERL:ENDPROC
  190 DEF PROCinit
  200 DIM g0%16,g1a%16,g1b%16
  210 FOR X%=0 TO 15:READ a$
  220 g0$=g0$+a$:g0%?X%=ASCa$:NEXT
  230 g0$=LEFT$(g0$,14)
  240 FOR X%=0 TO 15:READ a$
  250 g1a$=g1a$+a$:g1a%?X%=ASCa$:NEXT
  260 g1a$=LEFT$(g1a$,15)+CHR$13
  270 FOR X%=0 TO 15:READ a$
  280 g1b$=g1b$+a$:g1b%?X%=ASCa$:NEXT
  290 g1b$=LEFT$(g1b$,15):F$="TEXT"
  300 I%=himem:S%=HIMEM
  310 V%=0:L%=TRUE:ENDPROC
  320 DATA " ",e,t,o,n,a,i,r
  330 DATA s,h,l,d,c,u,>,>
  340 DATA p,w,m,g,y,f,b,v
  350 DATA k,x,z,j,q,',^,#
  360 DATA 0,1,2,3,4,5,6,7
  370 DATA 8,9,!,?,;,.,",-,#
  380 DEF PROCcomp:M%=0:P%=0:Q%=0
  390 F%=OPENIN F$:IF EOF#F% ENDPROC
  400 C%=0:K%=0:REPEAT PROCidx(P%)
  410 M%=M%+1:PRINT"Message ";M%
  420 PROCmess:UNTIL EOF#F%:ENDPROC
  430 DEF PROCidx(P%)
  440 Q%=Q%-1:I%?Q%=P%DIV256
  450 Q%=Q%-1:I%?Q%=P%MOD256:ENDPROC
  460 DEF PROCmess:L%=TRUE
  470 REPEAT B%=BGET#F%
  480 IF B%<32 IF B%<>13 B%=32
  490 IF B%>64 IF B%<91 PROCo(
  ):B%=B%
  OR32
  500 VDUB%:IF B%=13 VDU10
  510 PROCo(CHR$B%)
  520 UNTIL B%=13 OR EOF#F%
  530 IF B%<>13 PROCn(14):PROCn(15)
  540 IF NOTL% PROCn(0)
  550 ENDPROC
  560 DEF PROCo(Z$):C%=C%+1
  570 LOCAL J%:J%=INSTR(g0$,Z$)
  580 IF J% PROCn(J%-1):ENDPROC
  590 J%=INSTR(g1a$,Z$)
  600 IF J% PROCn(14):PROCn(J%-1):ENDPRO
  C
  610 J%=INSTR(g1b$,Z$)
  620 IF J% PROCn(15):PROCn(J%-1)
  630 C%=C%-1:ENDPROC
  640 DEF PROCn(N%)
  650 IF L% V%=N%:L%=NOTL%:ENDPROC
  660 S%?P%=V%+N%*16:P%=P%+1
  670 L%=NOTL%:K%=K%+1:ENDPROC
  680 DEF PROCsave
  690 PROCc("SAVE mess "+STR$
  S%+"+"+STR
  $~P%+" 0 0")
  700 PROCc("SAVE indx "+STR$~(I%+Q%)+"
  "+STR$~I%+" 0 0")
  710 PRINT""Input characters:",C%
  720 PRINT"Output characters:",K%
  730 LOCAL @%:@%=&2020A
  740 PRINT"Compression:",K%*100/C%"%"
  750 ENDPROC
  760 DEF PROCc($&700):LOCAL X%,Y%
  770 Y%=7:CALL &FFF7:ENDPROC
```

Listing II

```
  100 REM   Text Decoding
  110 REM  by Steve Turnbull
  120 REM (c) The Micro User
  130 REM ==================
  140 MODE 7:himem=HIMEM:HIMEM=TOP+&400
  150 PROCinit:PROCload:PROCdecode:END
  160 DEF PROCinit
  170 DIM g0%15,g1a%15,g1b%15
  180 FOR X%=0 TO 15:READ a$
  190 g0%?X%=ASCa$:NEXT
  200 FOR X%=0 TO 15:READ a$
  210 g1a%?X%=ASCa$:NEXT
  220 FOR X%=0 TO 15:READ a$
  230 g1b%?X%=ASCa$:NEXT
  240 g1a%?15=13:g1b%?15=0
  250 ENDPROC
  260 DATA " ",e,t,o,n,a,i,r
  270 DATA s,h,l,d,c,u,>,>
  280 DATA p,w,m,g,y,f,b,v
  290 DATA k,x,z,j,q,',^,#
  300 DATA 0,1,2,3,4,5,6,7
  310 DATA 8,9,!,?,;,.,",-,#
  320 DEF PROCload:F%=OPENIN"indx"
  330 L%=EXT#F%:CLOSE#F%:N%=L%/2
  340 PROCos("LO.indx "+STR$~HIMEM)
  350 PROCos("LO.mess "+STR$
  (HIMEM+L%))
  360 PRINT"No. of Messages = ";N%
  370 mst=HIMEM+L%:ENDPROC
  380 DEF PROCos($&700):LOCAL X%,Y%
  390 Y%=7:CALL &FFF7:ENDPROC
  400 DEF PROCdecode
  410 REPEAT INPUT""Message",M%
  420 IF M%<1 OR M%>N% UNTILTRUE:ENDPROC
  430 PROCmess(M%):UNTILFALSE:ENDPROC
  440 DEF PROCmess(M%)
  450 LOCAL E%,L%,P%,U%,w$
  460 P%=mst!(-(M%*2))AND&FFFF
  470 L%=TRUE:U%=TRUE:REPEAT B%=FNn
  480 IF B%<14 PROCo(g0%?B%)
  490 IF B%=14 PROCo(g1a%?FNn)
  500 IF B%=15 PROCo(g1b%?FNn)
  510 UNTIL E%:ENDPROC
  520 DEF FNn:LOCAL B%:B%=mst?P%
  530 IF L% L%=NOTL%:=B%AND15
  540 L%=NOTL%:P%=P%+1:=B%DIV16
  550 DEF PROCo(C%):LOCAL X%,L%
  560 IF C%=ASC" " U%=TRUE:ENDPROC
  570 IF U% IF C%>96 IF C%<123 C%=C%AND&
  5F
  580 U%=FALSE:L%=LENw$:X%=POS
  590 IF C%>32 w$=w$+CHR$C%:ENDPROC
  600 IF X%=0 ELSEIF L%+X%>39 PRINT
  610 PROCwd(w$+" "):IF C%=13 E%=TRUE:VD
  U10
  620 w$="":ENDPROC
  630 DEF PROCwd(w$)
  640 LOCAL L%:FOR L%=1 TO LENw$
  650 VDUASCMID$(w$,L%):PROCwt(.03)
  660 NEXT:ENDPROC
  670 DEF PROCwt(t):t=TIME+t*100
  680 REPEATUNTILTIME>t:ENDPROC
```

100 = 0 0	300 = FB3C B	500 = 6E77 C
110 = 0 0	310 = 242C 2	510 = 6FF5 F
120 = 0 0	320 = BB8F A	520 = 4D40 3
130 = 0 0	330 = BCB4 1	530 = 703F 4
140 = B2EE E	340 = 9FE7 A	540 = 55B2 3
150 = 422F B	350 = C51B C	550 = E94F 0
160 = 40D7 7	360 = 9373 A	560 = 2D66 F
170 = 8ACB 3	370 = E693 A	570 = B53D D
180 = 568E 3	380 = 61B0 B	580 = 8E47 4
190 = 8204 4	390 = DB66 E	590 = E25D F
200 = 568E 3	400 = 343E E	600 = 97D8 7
210 = 173B 7	410 = 8173 E	610 = 3BE0 E
220 = 568E 0	420 = F3FD 0	620 = B6C9 9
230 = 6FC1 E	430 = B66A 4	630 = 54CE 2
240 = 6177 E	440 = 90A1 E	640 = 99AF 4
250 = ED0F 1	450 = B106 3	650 = D68D 2
260 = 538E 5	460 = 9FE6 6	660 = E531 5
270 = 1560 9	470 = EFBF 7	670 = 37CA B
280 = 1870 3	480 = 5DB 2	680 = 8831 6
290 = E37B F	490 = E5F4 9	

100 = 0 0	330 = 1560 2	560 = 1E6B 0
110 = 0 0	340 = 1870 2	570 = DD98 3
120 = 0 0	350 = E37B 1	580 = 2881 C
130 = B2EE E	360 = FB3C 3	590 = C16F 0
140 = BBAD 3	370 = 242C 0	600 = F171 8
150 = E2FA D	380 = 35BA 1	610 = F8F 5
160 = 5783 8	390 = BAB6 C	620 = 615D 8
170 = 187D 0	400 = 3647 D	630 = 86D3 7
180 = 7580 C	410 = F918 6	640 = 3A86 7
190 = 40D7 2	420 = ABC0 1	650 = F8EA 1
200 = 91F8 7	430 = 918B C	660 = DF30 A
210 = 568E B	440 = 63B0 2	670 = 4168 7
220 = C994 3	450 = 75B3 9	680 = EB7 2
230 = 8327 9	460 = ED91 5	690 = 5270 D
240 = 568E 3	470 = 5C50 5	700 = 4FF0 7
250 = C3B F	480 = B70A E	710 = D840 9
260 = 10D4 5	490 = 2962 A	720 = 1433 F
270 = 568E E	500 = 1547 5	730 = E3F1 7
280 = 5FC4 0	510 = 283B 7	740 = A5E A
290 = 9757 3	520 = 9CD1 9	750 = ED0F A
300 = 9232 C	530 = 8C7A 1	760 = 8192 0
310 = 650F 0	540 = 31 3	770 = DB66 8
320 = 538E A	550 = ED0F 0	

This listing is included in this month's tape & disc offer. See order form on Page 141.

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ADJ22 Ref Manual		ADJ24 Adv	
Part I	£14(c)	Ref Manual	£19.50(c)
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Time Warp with PANOS Utilities. — **£39 (d)**

MODEMS

All modems listed below will be supplied with BBC Publications ModemMaster comms package and a BBC data lead.

MIRACLE WS2000V21/23 & BELL stds — **£92 (c)**
WS2000 Auto Dial Card — **£27 (d)**
WS2000 Auto Answer Card — **£27 (d)**
WS2000 SK1 Kit — **£5 (d)**
WS2000 User Port Lead — **£5 (d)**
MIRACLE WS4000 V21/23 — **£149 (b)**
MIRACLE WS3000 V21/23 — **£265 (b)**
MIRACLE WS3000 V22 — **£445 (b)**
MIRACLE WS3000 V22 bis — **£585 (b)**
(All modems are BABT approved)
BBC Data Cable for WS3000/4000 — **£7 (d)**

PROGRAMMING ACCESSORIES/SOFTWARE

See page 5 for detailed specification

Compatible with B, B+ and Master

EpromRyter (Epromer II)
Eprom Ryter is compatible with BBC Master only — **£119 (b)**
Upgrade of Epromer II to Eprom Ryter (Please return your Epromer II) — **£49 (b)**
EPROMER II — **£89 (b)**
MPROMER — **£49 (c)**
META ASSEMBLER — **£145 (b)**
PORTAL EPROM EMULATOR 512K — **£245(b)**
TEAM Disassembler — **£145 (b)**

EPROM ERASERS
UV1B 6 eproms, safety cutout — **£47 (b)**
UV1T 6 eproms, timer, safety cutout — **£59 (b)**

TECHNOMATIC

BBC COMPUTERS & ECONET CENTRE
17 Burnley Road, London NW10 1ED Tel: 01-208 1177
305 Edgware Road, London W2 Tel: 01-723 0233

CAD/DRAWING PACKAGES

NOVACAD
Cad Package for B, B & MASTER.
(See page 5 for specification)

Tracker Ball/Mouse Version (TM)	£79 (d)
TM Version plus Tracker Ball	£119 (c)
TM Version plus Mouse	£105 (c)
Plotter Driver Generator	£25 (d)
MOUSE AMX MOUSE with SUPER ART (pse specify B, B+ or Master)	£63 (d)
PAGEMAKER	£32 (d)
EXTRA/EXTRA (utility for the Pagemaker)	£19 (d)
MAX	£17 (d)
STAND ALONE MOUSE (includes horizontal scroll lock)	£34 (c)
RB2 TRACKER BALL RB2 Tracker Ball with Icon Master (for B, B+ & Master)	£59 (c)
RB2 Tracker Ball with Cursor Control Rom (for Master only)	£59 (c)
RB2 Tracker Ball 'Stand Alone' for use with NOVACAD & other software)	£47 (c)
Cursor Control Rom for Master	£12.50 (d)
MIRRORSOFT FLEET STREET EDITOR	£35 (d)

CP/M SOFTWARE

Send for details on our full range of CP/M & PC DOS packages for Business, Communications & High Level Languages.

Please send for details on our range of CP/M software for Acorn/Torch Z80 2nd Processors

BBC SOFT/FIRMWARE

*All software supplied by us is known to operate with the appropriate Acorn Disc filing systems. We **cannot** comment on their use with other DFS systems.*

DATABASE MANAGEMENT SYSTEMS

VIEWSTORE	£37 (d)
STARdataBASE	£39 (d)
MASTERFILE II	£17 (d)
ACORN OVERVIEW PACKAGE Special Offer (RRP £86)	£57 (b)

WORD PROCESSORS

ACORN VIEW PROFESSIONAL	£85 (c)
VIEW 2.1	£37 (d)
VIEW 3.0	£54 (c)
VIEW INDEX	£12 (d)
VIEW PRINTER DRIVER GENERATOR	£7 (d)
VIEWSPELL	£29 (d)
DOT PRINT PLUS	£28 (d)
WORDWISE	£24 (d)
WORDWISE PLUS	£38 (d)
WYSIWYG PLUS	£21 (d)
SPELLMASTER	£47 (d)
INTERWORD	£39 (d)
WORDEASE	£24 (d)
SPELLCHECK III	£31 (d)
EDWORD II	£43 (c)

SPREADSHEETS

VIEWSHEET	£37 (d)
WINDOWMATIC	£15 (d)
VIEWPLOT	£22 (d)
INTERSHEET	£37 (d)
INTERCHART	£26 (d)
ULTRACALC	£29 (d)
MINI OFFICE II DISC Version For B & B+ 40T or 80T	£14.50 (d)
For Master 80T	£17.30 (d)
For Compact	£19 (d)
MINI OFFICE II ROM Version For Master, Compact, B+ & B	£48 (c)

LANGUAGES

META ASSEMBLER	£145 (b)
TEAM DISASSEMBLER	
MACROM	£33 (d)
ACORN MICRO PROLOG	£62 (d)
ISO-PASCAL	£51 (c)
ISO-PASCAL STAND ALONE GENERATOR	£30 (d)
OXFORD PASCAL (40 or 80T) Specify B or B+	£36 (d)
OXFORD PASCAL for Master	£52 (d)
ACORN LOGO	£46 (c)
LOGOTRON LOGO	£55 (c)
BBC PUBLICATIONS OPEN LOGO	£59 (c)
ACORN LISP ROM	£43 (d)
ACORN FORTH ROM	£39 (d)
ACORN COMAL ROM	£43 (d)
MICROTEXT	£52 (c)
MICROTEXT PLUS	£229 (b)

COMMUNICATIONS

TERMULATOR	£25 (d)
COMMSTAR II	£28 (d)
COMMUNICATOR	£49 (d)
MODEM MASTER	£11 (d)
COMMAND	£34 (d)
MASTER TERMULATOR	£34.75 (d)

COMPACT (all on 3½" disc)

ARTROOM	£27 (d)
FONTWISE+	£22 (d)
FONT EDITOR	£22 (d)
RAMROD	£37 (d)
BROM PLUS	£32 (d)
MACROM	£37 (d)
BETABASE	£27 (d)
WHITE KNIGHT MKII	£16 (d)
BBC PUBLICATIONS BUNDLED SOFTWARE	£18.50 (d)

UTILITIES

ACCELERATOR	£49 (d)
ACORN BASIC EDITOR	£24 (d)
MONITOR (BBC Pub)	£19 (d)
BROM PLUS	£26.50 (d)
SLEUTH	£23 (d)
TOOLKIT PLUS	£31 (d)
TOOLBOX 2 (BBC Pub) Manual	£9.50 (d)
Cassette	£9 (d)
ACORN GXR GRAPHICS ROM specify B or B+	£24(d)
PRINTMASTER	£24 (d)
PRINTWISE	£24 (d)
DUMPMASTER	£26 (d)
FONTWISE PLUS	£17 (d)
HERSHEY FONT CHARACTER GENERATOR	£18 (d)
ICON MASTER	£29 (d)
MOVIE MAKER Two Roms + Cassette	£26 (d)
ADV TELETEXT UTILITIES ROM	£7.95 (d)

BBC PUBLICATIONS EDUCATIONAL SOFTWARE

A series of programs developed in many cases alongside Radio & TV programmes by BBC's Education Department which supplement the classroom studies by moving and colourful displays helping in clear understanding of a variety of subjects. Some packages also include audio cassettes.

PRIMARY EDUCATION

ASTRONOMY	£11 (d)
COMPUTERS AT WORK	Aud/EC/disc £16 (c)
PICTURE CRAFT	Disc £17 (d)
INTRODUCING GEOGRAPHY	Disc £16 (d)
MATHS WITH A STORY 1	Cass £8 (d)
MATHS WITH A STORY 2	Cass £8 (d)
NUMBER GAMES	Cass/EC £7.50 (d)
USING YOUR COMPUTER	Cass £24 (c)

SECONDARY LEARNING

TECHNOLOGY & DESIGN Pt1	£21.50 (c)
ELECTRIC FIELDS	£10.50 (d)
ADVANCED LEVEL STUDIES: STATISITICS	Disc £23 (d)
ADVANCED STUDIES: GEOGRAPHY	Cass £10 (d)
INSIDE INFORMATION	Prog Cass £10 (d)
	Audio Cass £5 (d)
	Book £8 (d)
SCIENCE TOPICS (ST)	
S.T.:WAVES	Disc £14 (d)
S.T.:RELATIONSHIPS	Disc £14 (d)
S.T.:BONDING	Disc £14 (d)
S.T.:ELECTROMAGNETIC SPECTRUM	Disc £14 (d)
S.T.:ELECTRONICS IN ACTION	Disc £14 (d)
S.T.:NEWTON & THE SHUTTLE	Disc £19 (d)
S.T.:ECOLOGY	Disc/EC £19 (d)
S.T.:POLYMERS	Disc/EC £19 (d)
S.T.:CLASSIFICATION & PERIODIC TABLE	Disc £20 (d)
S.T.:FOOD & POPULATION	Disc £20 (d)
SEC.SCIENCE MICROTECHNOLOGY	Cass £7 (d)
SEC.SCIENCE:THE MOLE CONCEPT	Disc/Aud/EC £16 (c)

GENERAL

VU-TYPE PROFESSIONAL	Disc £19 (d)
WHITE KNIGHT MK II (for compact)	Disc £16 (d)
BATTLEFIELDS	Cass £8.50 (d)
A VOUS LA FRANCE	Cass/EC £17 (d)
	Book £5.25 (d)
	Audio Cassettes (2) £7.50 (a)
Additional charges for discs	£9.00 (d)
DEUTSCH DIREKT	Disc/aud/EC £16 (c)
	Book £5.95 (d)
MODEM MASTER	£11 (d)

Cassette based programs listed above can be supplied on disc at an extra charge of £1.50 per disc and please specify the format required 40 or 80T.

TECHNOLINE
(24 hr viewdata system)
Tel:01-450 9764

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(near Edgware Road ⊖)

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(a) £8.00 (Datapost)
(b) £2.50
(c) £1.50
(d) £1.00

PRINTER ACCESSORIES

EPSON ACCESSORIES:
Interfaces:
8143 RS232.....£30 (d)
8148 + RS232 + 8K.....£65 (d)
8165 IEEE + Cable.....£65 (d)
8132 Apple II.....£60 (d)
8177P NLQ for FX80 + /FX100 + ...£99 (d)
Parallel & Serial Buffers of various size also available.
FX80/80 + /85 Tractor Attachment.....£29 (c)
LX80/86 Tractor Feed.....£21 (c)
LQ800 Tractor Feed.....£47 (b)
LQ1000 Tractor Feed.....£52 (b)
EX800/1000 Colour option.....£59 (b)
H180 HP GL Emulation Rom + Ram.....£63 (c)
H180 Printer Emulation Rom.....£38 (c)
SHEET FEEDERS:
8338 LX80.....£52 (b)
8333 FX100 + /105.....£169 (a)
8331 FX80 + /85.....£129 (b)
LQ800.....£135 (b)
LQ1000.....£179 (b)
EX800.....£135 (b)
EX 1000.....£309 (b)
FX 800.....£135 (b)
FX 1000.....£179 (b)
Ribbons:
RX/FX100/100 + . FX105.....£7 (d)
RX/FX80/80 + , FX85.....£4 (d)
LX80.....£4.50 (d)
LQ800.....£8.50 (d)
LQ1000.....£10 (d)
EX800/1000.....£7.50 (d)
H180 Pen Set (Aqueous/Ball point).....£8.25 (d)
Dust Covers:
FX80.....£5.50 (d)
TAXAN/Canon KP810.....£6 (d)
FX100.....£7.50 (d) KP910 £7 (d)
HITACHI 672 Plotter
Aqueous Pen Set six pens.....£18.50 (d)
Oil Based Pen Set six pens.....£25.00 (d)
TAXAN CANON Accessories:
RS232 + 2K interface.....£63 (d)
Ribbon, KP810/815/910/915.....£6 (d)
Star Printer
NL10 Sheet Feeder.....£52 (b)
NL10 RS232 Interface.....£69 (c)
NL10 IBM Type Interface.....£39 (c)
NL10 Ribbon.....£4.50 (d)
National Panasonic KX P1080/81
Spare Ribbon.....£4.50 (d)
Serial Interface.....£39 (c)
KXP3131 Tractor.....£90 (a)
KXP3131 Sheet Feeder.....£189 (a)
JUKI 6100
RS232 Interfaces.....£65 (d)
Tractor Feed.....£149 (a)
Ribbon (Carbon).....£2.00 (d)
Spare Daisy Wheel.....£14 (d)
Sheet Feeder.....£219 (a)
BROTHER HR20
Daisy Wheel.....£18 (d)
Tractor Feed.....£116 (a)
Spare Ribbon Nylon.....£3.00 (d)
Spare Ribbon Carbon.....£4.50 (d)
INTEGREX INK JET COLOUR PRINTER
Spare Ink Cartridge Black.....£9 (d)
Spare Ink Cartridge Colour.....£15 (d)
Paper Roll.....£7 (d)
Printer Leads:
BBC Parallel Lead (1.2m).....£6 (d)
BBC Serial (Epson) Lead (1.2m).....£7 (d)
Other lengths can be supplied on order:
IBM Parallel Lead (2m).....£12 (d)
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Plain Fanfold paper with micro perforations:
2000 sheets 9½"x11" 60 gsm/sq m.....£12 (£3)
2000 sheets 14½"x11" 60gsm/sq m.....£18.50 (£4.50)
1000 sheets A4 90 gsm.....£12 (b)
Labels/1000:
Single Row 3½ × 1 7/16".....£5.25 (d)
Triple Row 27/16" × 17/16".....£5 (d)

WYSIWYG PLUS

WYSIWYG PLUS is a printer and screen utility for Wordwise Plus, View, Interword, and Basic users, supplied on a 16K Eprom. To obtain a particular printer effect, such as enlarged text, it used to be necessary to discover the appropriate 'printer control code' from your manual and incorporate it into your text. Secondly, you had to print several trial copies in order to position the effect correctly in relation to the rest of your text.

WYSIWYG PLUS simplifies this trial and error approach using easily remembered *commands. For example, *ENLARGED not only selects enlarged text on your printer, but uniquely shows you double width characters on your screen, even from within Wordwise Plus!

WYSIWYG PLUS incorporates a logo editor. Just draw your design on screen using the arrow keys, and save the results. Use the *GRAPHICS command to incorporate your design anywhere in your text; position and see your design in your text before faithfully reproducing a hard copy.

There is also special help for daisy wheel users. The *WHEEL command will prompt you to change daisy wheels whenever a change in type style is about to occur.

WYSIWYG PLUS is designed to work with the following systems:

BBC Model B
BBC Model B+
BBC Master 128
BBC Compact

6502 Second processor,
Turbo coprocessor
All printers (Except lasers)

WYSIWYG PLUS workspace is relocatable.

WINDOWMATIC

All users of Acorn's VIEWSHEET speadsheet program will be aware of its powerful windowing facility which allows the screen and/or printer to be configured in up to 10 seperate windows taken from anywhere in the sheet. They will also be painfully aware of how difficult and time consuming it is to set up a required display. Although VIEWSHEET allows configurations to be saved to the media, it does not have provision for deciphering them.

WINDOWMATIC has been produced with the intention of rectifying these shortcomings and to bring out the very best from VIEWSHEET.

WINDOWMATIC provides a quick and easy way to configure screen and printer allowing complicated documents and reports to be set up much more easily. It displays complete text information on all 20 windows and accurate graphic representation of the screen and printer output.

The package includes a screen dump routine for Epson printers and allows use of other printer dump packages.

WINDOWMATIC is compatible with BBC Master and BBC B+. A 6502 2nd processor must be fitted to a model B to run Windowmatic. Windowmatic is fully compatible with Turbo and 6502 2nd processor.

The program is supplied on disc with a comprehensive manual.

VU-TYPE

Do you have finger trouble when typing?
Do your letters look like this?

Dear Sor,
I wuold like to .....

then you need:

VU-type, a complete touch typing program produced by BBC/Pitman.

It allows you to learn at your own pace and has a wide range of exercises. Screen displays show the keys you have pressed and it will report on your speed and accuracy.

Supplied on a 40T Disc with a manual.

Available at a special price of £7.50(d)
instead of the usual £15. Offer valid while stocks last

EDUCATIONAL/FUN SOFTWARE BUNDLE

Wordmover
Wordplay
Pantry Antics
Drawstick
Locomotion

These programs are supplied from the BBC Publications Educational Software range and will be supplied on a 5.25" disc for BBC Master, B+ and B and on a 3.5" disc for the Compact.

5.25" Disc £17.50(d)
3.5" Disc £18.50(d)

(Normal RRP over £40)

BOOKS

No VAT Carriage Code (c)

LANGUAGES
6502 Assy Lang Prog.....£19.95
6502 Programming.....£13.95
8086 Book.....£23.95
Acorn BCPI User Guide.....£15.00
Acorn FORTH.....£7.50
Acorn LISP.....£7.50
Acorn ISO Pascal Ref Manual.....£10.00
Intro to COMAL.....£10.00
Intro to LOGO.....£7.50
Micro Prolog Ref Manual.....£10.00
Introduction to Turbo Pascal.....£14.95
Prog the Micro with Pascal.....£8.50
The Supervisor's BBC Micro.....£10.95
BBC MICRO GUIDE BOOKS
Inside Information.....£8.95
Maths Prog in BBC Basic.....£7.95
The Friendly Computer Book.....£4.50
Toolbox 2.....£10.95

PROGRAMMING/UTILITY
Advanced Sideways Ram User Guide.....£9.95
Advanced User Guide (BBC).....£15.95
Applied Assembly Language on the BBC.....£9.95
BBC Micro Advance Programming.....£9.95
BBC Micro Ref Guide (B Smith).£10.95
BBC Micro Sideways ROM's RAM's £9.95
Guide to the BBC ROM.....£9.95
Beginners Guide to W.P.....£7.95
Mastering Assembly Code.....£8.95
Mastering Interpreters & Compilers.....£14.95
Mastering View, Viewsheet & Viewstore.....£12.95
View by B. Smith.....£12.95
View 3.0 User Guide.....£10.00
Viewstore User Guide.....£10.00
Viewsheet User Guide.....£10.00
Wordwise Plus.....£9.95

SOUND & GRAPHICS
Computer Graphics & CAD Fundementals.....£9.95
Mastering Music.....£6.95
DISC DRIVE SYSTEMS
Advanced Disc User Guide.....£16.95
Disc Book.....£3.50
Disc Programming Techniques.....£7.95
Disc Systems.....£6.95
File Handling on the BBC.....£6.95
Discovering Disc Drives.....£POA
Practical Disc File Techniques.....£5.95
Mastering the Disc Drive.....£7.95
Mastering DOS plus.....£12.95
APPLICATIONS
Interfacing Proj for BBC.....£6.95
BBC and Small Business.....£5.75
The Software Business.....£5.50
Master Operating System (David Atherton).....£12.95

TECHNOMATIC

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NOVACAD

Computer Aided Draughting for the BBC Micro

"Novacad can drive a plotter to provide drawings of a high quality... Novacad is excellent. It is flexible, genuinely easy to operate without much practice, and a pleasure to use." **Beebug December 1986**

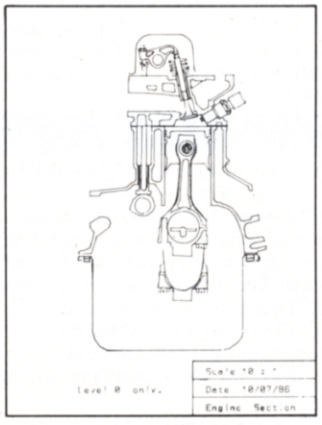
"Novacad is a professional package, well worth the £90 for the ROM and disc and is expandable to suit your own particular requirements. I would have no reservations if I heard Novacad called, "the best on the market"." **A&B Computing August 1986**

A sophisticated CAD package with unique facilities which are generally confined to the professional CAD packages costing thousands of pounds.

NOVACAD is being used in widely differing fields ranging from leading British industries for producing engineering drawings to Accountants' offices for producing flow charts. Architects, engineers, plumbers, kitchen planners and many other professions requiring easy to use facilities for producing professional quality output are making extensive use of NOVACAD's unique features. NOVACAD is proving to be a invaluable teaching aid in technical schools and colleges simply because of the ease with which it can be used.

NOVACAD'S MAJOR FEATURES

* Simple and easy to use with logical command sequence.
* A large drawing area (approx 15 screens).
* The ability to create complex icons (upto 500 lines instead of the usual 15 to 20 pixels), store them in a library and recall them at different scales and orientations.
* A zoom facility allowing magnification of up to 20 times to insert finer details.
* Block copy of shapes on the screen for repetitive use.
* Text entry at any 90° orientation at any position on the screen.
* Create multi layer drawing with 8 levels available.
* Full compatibility with the BBC range with minimal hardware requirements yet having the capability of exploiting the potential of the extra shadow memory or the second processor's memory and speed.
* Printer routine for Epson 80 and 136 column printers.
* A unique optional facility to output to any BBC compatible plotter.
* Cursor control from keyboard, tracker ball or mouse.



NOVACAD package includes a 16K ROM, Utility disc and a comprehensive manual.

MINIMUM HARDWARE REQUIREMENTS

- **Any BBC range computer with Acorn DFS.**
- **40 Track single sided single drive.**
- **Epson compatible dot matrix printer.**

With basic BBC B, NOVACAD operates in mode 4 allowing use of any 2 colours. With shadow memory of the BBC + or the Master, it can also operate in mode 0 for higher resolution or mode 1 for allowing use of any 4 colours, and it will provide additional user memory for more complex drawings.

6502 second processor or the Turbo on the Master will also increase the drawing speed considerably.

OPTIONAL EXTRAS

Plotter driver generator is available as an optional extra to configure a plotter routine for any BBC compatible plotter. Pre-configured programs for the popular plotters like **Epson HI 80, Hitachi 672, Plotmate, Penman** and **HP GL.** This program allows the drawing to be scaled to the maximum plotter size thus enabling drawing of A2 and A3 sizes to be produced with equal ease. The zoom facility will enable inaccuracies of drawing on the screen to be eliminated.

ROUTCAD, an optional software package for our Graphics Workstation allows for production of shapes drawn using NOVACAD in 3D on suitable material and is ideal for a range of applications including template making and model building.

EpromRyter

A powerful eprom programmer for use with the BBC Master. It offers the latest 'state of the art' programming techniques to provide fast and efficient operations.

The software is totally menu driven and on screen help messages make the programming simple for both specialists and novices alike.

The EPROMRYTER interfaces with the Master through 1 MHz bus. It is mains powered with its own psu. 3M Textool zif socket has been fitted to ensure consistent and reliable service over long periods.

The single rail eproms handled by the EpromRyter are:

- 2716 2732 2764 27128 27256 27512 27513 27011 2516 2532 2564 (NMOS & CMOS)
- One time eproms P27XXX, 87CXXX etc.
- Also A suffix eproms such as 27XXXA

The main features of the programming software are:

* Device, function and voltage selection from the computer keyboard.
* Continuous display of the options selected.
* All eproms upto 27512 (64K) programmed in single pass.
* Automatic Intelligent identifier support for eproms able to respond.
* Selectable programming voltage 25/21/12.5V
* 3 programming methods: Normal, Intelligent & Pulse (20 sec for a 27128).
* Serial port protocols supported.
* DFS, NFS, ADFS and Rom Filing System Supported.
* BASIC/Machine Code programming using RFS.
* Powerful editor with input in HEX or ASCII. * Full editable 64K file.
* Block move of data within the address range.
* User can select any section of the eprom from single byte to the full address range to blank check/burn/verify. Facility to program single bytes makes program development/amendment simpler.
* Multiple loading for ROM Filing System

Some of the above features apply to Master Computers only

EPROMER II

A proven Eprom programmer for BBC Model B and B+ with thousands in use in industry, educational and R&D establishments. It offers many of the powerful features of the EpromRyter and can program all single rail eproms upto 27256. Full details on request.

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(24 hr viewdata system)
Tel:01-450 9764

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(c) £1.50
(d) £1.00

Back by customer demand

Technomatic's 20Mbyte Winchester Drive

Only £499 (a)

(This offer valid whilst current stocks last)

Special Adaptor for S.J. Research File Server **£28**

* Cased with power supply and cooling fan
* 1 MHz bus extension cable
* Fully compatible with Acorn ADFS and FS III
* Fully compatible with S.J. Research file server
* 12 months warranty

FREE MASTER OFFER

Every Master and Master Compact purchased at our usual price will include the following:
An educational/fun bundled software package comprising of:

VU-Type, Wordmover, Wordplay, Drawstick, Locomotion and Pantry Antics

3½ DISC DRIVES

* 400K/640K capacity per drive in DFS/ADFS modes
* Mitsubishi 80 track double sided ultra low power, fast access mechanisms
* The drives are supplied fully cased and with cables ready for connection to a computer
* Drives powered from the computer * 2 years warranty

Single Drive £75(b) Dual Drive £134(b)

META Version III

"All the good features you would expect to find in a good source code editor are present . . . Meta assembler lives in a different world. It is structured to work with any new processor . . . as new instruction sets can be added . . . as needed . . . has a well featured editor with colour highlighting, a sound modular approach."
Acorn User October 1986

- Assembles for over 30 popular processors, including Z80, 6800/01/02/04/05/09/11 etc — and 68000 — using native mnemonics for each processor, eg. LD A, (HL) for Z80 and MOV AO, $1000 for 68000 etc.
- Fully integrated Editor: four field, all search, search/replace, block copy, delete, move, marked save, load etc.
- Compatible with Portal Eprom Emulators and Team Disassemblers.
- Send object code in Intel Hex, S-Record, straight binary etc. down to discs, RS232, parallel port, Eprom Emulators etc — all **during Assembly.**
- Over 50 directives included as standard: handling nestable macros, conditional assembly and twenty types of table definition directives.
- 32 bit labels; 31 character names. Arithmetic and Boolean arithmetic to 32 bits.
- Modular source code with numeric and string parameter passing.
- Serial communicator area with eight options lines: echo, control code trap, LF supression/addition etc.
- Over 500 in use throughout the world in universities and many different industries.
- Two 16K Roms, two 80 track discs, A4 ring-band manual, function-key strip.

PORTAL EPROM EMULATORS

- Emulates 2716, 2732, 2764, 27128, 27256, 27512 eproms at 150ns Access time.
- Load at 4Kbytes/second — No "erase" time.
- 28 pin header plugs into Eprom socket on target system — status monitored on 13 Leds.
- Fully software controlled from Meta Assembler.
- 100 times faster than standard EPROM program/erase cycle.
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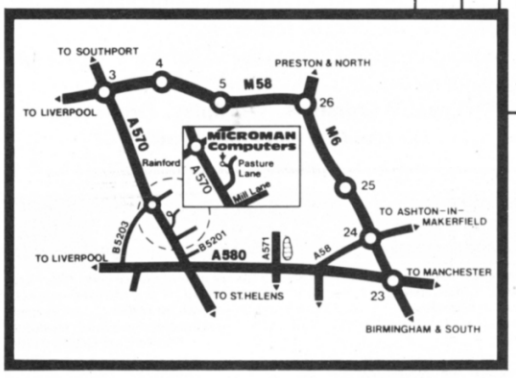

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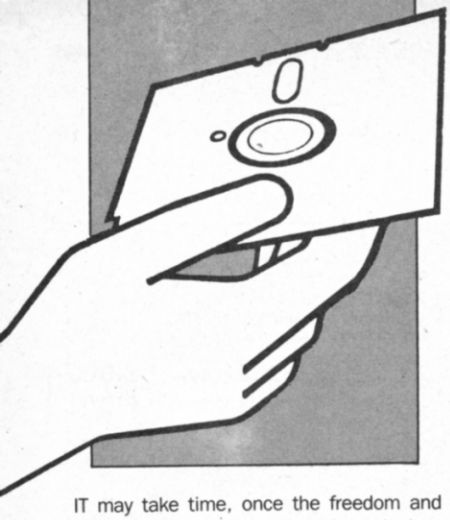

"Hello DFS. Do you COPY?"

John Kelk provides the file copy procedure that everyone's been waiting for

IT may take time, once the freedom and speed provided by a disc upgrade has been appreciated, to realise that not everything is possible.

For example, with a single disc drive copying many files from disc to disc involves multiple disc insertions and removals. Even with dual disc drives such block copying may involve many uses of the *COPY command if not all of the files on a disc are to be copied.

More important, it is not possible to copy files directly from one side of a disc to the opposite side of another on double sided disc drives. The block disc copier given here is an attempt to overcome all these drawbacks for Acorn DFS compatible systems.

In this program the computers memory is used to hold as many files as possible at one time. They can then be saved in one operation to another disc or even to the opposite side of the same disc.

As the BBC Micro memory is limited it is important to use as much of it as possible. In the standard Acorn DFS files may be loaded from &1100 to &7C00 in Mode 7 without corrupting the screen or the DFS workspace.

If all this is to be available for storage the copier program must be stored somewhere below &1100. In fact the code is assembled at &880 and uses almost all the memory from there up to &D00, the start of DFS workspace.

In addition, various other areas are used as buffers to hold filenames, load and execution addresses, file lengths and parameters for osword and osfile commands.

The result is that all &6B00 bytes (27k) from &1100 to &7C00 are available for file storage. Disc storage exceeds even this, so more than a single disc swop may still be necessary if many large files are to be copied. The number of swops will, however, be minimised.

Operating the program is straightforward. You are first asked which disc surface you want to copy from and then which disc surface you wish to save files to. The disc surface may be any drive number from 0 to 3.

At this stage the disc to be copied from should be in the appropriate drive. Its catalogue is read using osword &7F and a list of its files is displayed in yellow on the screen. Below this a menu of three options.

The file at the current cursor position (coloured cyan) can be loaded into memory (Copy key). All files already in memory may be saved to the new disc surface (@ key). Finally to exit the program press Escape.

The cursor keys are used to move through the catalogue in any direction.

As files are selected for storage they are loaded to ram, using osfile, and omitted from further consideration so that they aren't saved more than once by mistake. On screen such files are coloured red and the cursor skips past them when being moved around.

Memory locations keeps an update of how many free bytes of ram remain and any files in the catalogue whose length exceeds this, and may not be copied on this pass, are coloured blue. The cursor skips past these as well.

File saving is activated either by

Turn to Page 118 ▶

adrive, bdrive	Drive numbers for copy and save respectively.
drloc1, drloc2	Acorn DFS drive selection bytes.
buffer1, buffer2	Acorn DFS file catalogue buffers.
buffer3	Flags to show file status: whether available for save, already saved or too large for remaining ram.
buffer4	Temporary storage of *buffer2* while saving ram
files	Number of files in the catalogue.
fileno	Current file under consideration.
param	Start of parameter block for osfile.
start	Pointer to next available ram for loading.
bytes	Amount of free ram remaining.
xpos, ypos	Screen cursor position.

Figure I: Main variables

820 initialise	Sets mode, enables cursor keys, initialises parameter block, *buffer3*, *start* and *bytes*.
290 copyfiles	Organises cursor movements to permitted files on screen and calls the load or save routines when required. Note: names of files to be loaded are read directly from the screen by subroutine *fetchname*.
2860 getdrives	Prompts for source and destination drives and stores these in *adrive*, *bdrive* respectively.
1000 readcat	Reads sectors 0 and 1 from track 0 of the source disc and stores these in *buffer1* and *buffer2*. This is the catalogue information on the Acorn DFS.
1150 displaycat	Displays the full name of all files in the source disc catalogue on screen.
1650 load	Loads a selected file from source disc then updates *start*, *bytes*, the appropriate positions in *buffer3* and the screen.
2050 save	Saves all files in ram to the destination disc resetting *start*, *bytes*, the appropriate locations in *buffer3* and the screen.

Figure II: Main subroutines

◀ *From Page 117*

pressing the @ key or automatically if no further files in the catalogue fit into the remaining available ram or if all files in the catalogue have been loaded.

A prompt is given to insert the destination disc and, after all files have been saved, using osfile again, a further prompt is given to reinsert the source disc, if necessary.

After saving, any files which had been excluded because of length, are restored to yellow and can be copied on a second pass through the load/save cycle. Files already saved remain red and are not selected again. The cursor is set to continue from where copying left off.

Files to be copied may be locked or unlocked. Even files whose names use control codes are listed in the on-screen catalogue by a question mark.

The copier program may be run directly from disc by *COPIER or, if already installed, by CALL &880. The only files that can't be copied are those which by themselves are longer than the available memory.

```
  10 REM ******************
  20 REM *BLOCK DISC COPIER*
  30 REM *  By John Kelk   *
  40 REM *(c)The Micro User*
  50 REM ******************
  60 oswrch=&FFEE:osword=&FFF1
  70 osbyte=&FFF4:osrdch=&FFE0
  80 osnewl=&FFE7
  90 osfile=&FFDD
 100 drloc1=&CF:drloc2=&10CB
 110 files=&80:fileno=&81
 120 xpos=&82:ypos=&83
 130 lo=&84:hi=&85
 140 stack=&86:adrive=&87:bdrive=&88
 150 flag=&89:xtemp=&8A:ytemp=&8B
 160 buffer1=&E00:buffer2=&F00
 170 buffer3=&780:buffer4=&500
 180 address=&7A0:param=&7E0:length=par
am+10
 190 name=&7F2:start=&7FC:bytes=&7FE
 200 FOR pass=0 TO 3 STEP 3
 210 P%=&880
 220 [OPT pass
 230 TSX:STX stack
 240 JSR initialise
 250 JSR getdrives
 260 JSR readcat
 270 JSR displaycat
 280 JSR displaymenu
 290 .copyfiles
 300 LDA adrive:STA drloc1:STA drloc2
 310 LDX fileno
 320 .loop1
 330 LDA buffer3,X:BEQ goodfile
 340 INX:CPX files:BNE loop1
 350 LDA fileno:BNE keeplooking
 360 RTS
 370 .keeplooking
 380 LDX #0:STX fileno:BEQ loop1
 390 .goodfile
 400 STX fileno
 410 JSR getscreenpos
 420 LDA #134:JSR oswrch
 430 LDA #8  :JSR oswrch
 440 .searchkey
 450 JSR getkey:CMP #136:BNE up
 460 LDA #1:STA less+4:BPL less
 470 .up
 480 CMP #139:BNE right
 490 LDA #4:STA less+4
 500 .less
 510 LDA fileno:SEC:SBC #0:BMI searchke
y
 520 STA fileno:TAX
 530 LDA #131:JSR oswrch
 540 .loop2
 550 LDA buffer3,X:BEQ goodfile
 560 DEX:BPL loop2
 570 LDX files:DEX:STX fileno
 580 BPL loop2
```

Turn to Page 133 ▶

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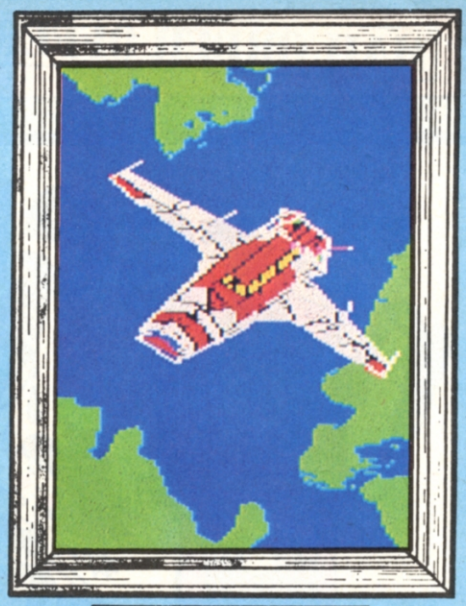
GALLERY

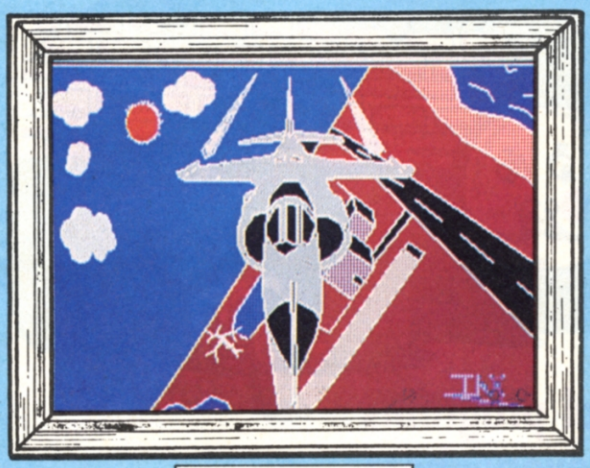
No. 6

THANKS for the pictures – keep sending them in. This month we feature some works of art by Duncan Eastaugh, Andy Smith and Martin Harris. We don't mind whether it's just one masterpiece or a full gallery that you send – if the pictures are good you'll see them in print. Please send screen dumps on disc or tape with a note saying which mode they use.

The address to send them is Gallery, The Micro User, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.



Stratosphere by Andy Smith



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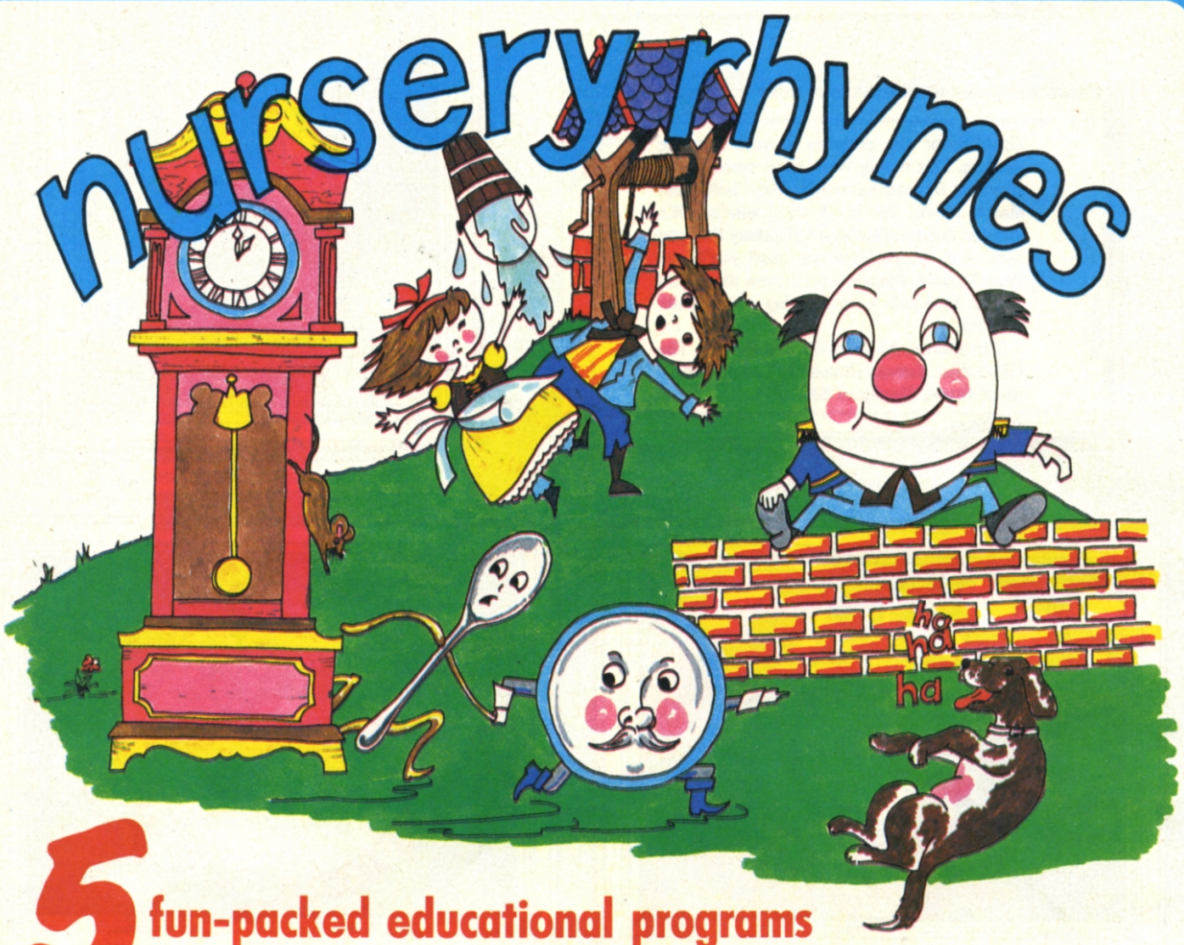

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TO ORDER TURN TO THE FORM ON PAGE 141

LETTERS

£10 Prize letter

Basic hints for beginners

THE letters in the June issue of The Micro User *asked for more basic hints. Here are a few that I find useful and wish that I had known as a beginner:*

Pressing Control+L is a quick way of clearing a text screen.

Pressing Control+N causes paged mode to start up. This stops a list of more than one screenful from scrolling and disappearing off the top of the screen. The same keypress often allows you to read output from a program that more than fills the screen.

To allow one page of scrolling give Shift a quick press and if you want to stop and edit your listing press Escape. Of course, after this you will have to type List (or L. for short) again to resume listing.

If you find it difficult to press Shift by just the right amount to advance by one screenful try clearing the screen and typing LIST n, (or L.n,) where n is the number of the line which was at the bottom of the last screen.

The comma is important, without it only line n will appear. Pressing Control+O cancels a press of Control+N.

To halt a program at any stage when running insert the line:

```
IFGET
```

at the appropriate place. The program will start running again – from where it left off – when you press a key. (The space bar for instance.)

This can be useful when debugging and the line can be deleted later. – **Eileen Shone, Wirral, Merseyside.**

Ribbon rub-off

I HAVE a problem with my printer. Ever since I acquired a new ribbon it has been leaving marks on the paper where the head has been moving. If I leave the printer for a day or so a large spot of ink appears on the paper underneath the printer head.

I have checked with the manual and the position of the head is correct. Any help would be gratefully received! – **Andrew Smith, Chorleywood, Herts.**

● On most printer heads there is a shield to prevent the ribbon touching the paper. Make sure your ribbon is behind that shield.

Booting Prommer

I HAVE just finished typing in the utility program Prommer from the June issue of The Micro User *and wonder if it is possible to load the code into sideways ram on booting the disc.* – **A.J. Bryant, Camberley, Surrey.**

● The way to load code into sideways ram on booting depends on your type of hardware. But even if you can do it the operating system will still not know that the sideways ram has been loaded and consequently you will be unable to run any programs from it until you press Control + Break.

For the Compact, you can use the SRLOAD command with the I option for immediate initialisation.

McBrolly crash

WHEN I bought the June issue of The Micro User *I typed in the checksum program and used it to check the McBrolly game – everything agreed exactly after I had found the usual typing errors.*

It ran okay and I managed to solve the first screen but when the second screen appeared I got "no room at line 1650".

Can you tell me what is wrong as I have found Gordon Key's programs to be very good. I have typed in both Dino and Hunkie-Egg with no problems. I can't see how my listing can be wrong as it checks against the checksums, both individually and in combination. – **D.T. Elwyn, Haddington, East Lothian.**

● The checksum program does not indicate unnecessary spaces at the beginning of lines so if you have typed a lot in then it could cause this problem – extra spaces you have typed at the end of lines are indicated by an asterisk after the checksum digits and these should also be removed.

Carousel problem

I TYPED in and used the excellent program Teletext Carousel from the March issue of The Micro User. *But Morley has now replaced my rom with an ATS rom which appears to run in a different way to the old one.*

The program doesn't appear to function with the new Rom and Bad program appears when I attempt to load and save pages using it.

Have you managed to convert the program to the new rom? – **M.J. Golz, Harrow-on-the-Hill, Middx.**

● The ATS rom on the Morley adapter works the same as the ATS rom for the Acorn adapter. So, you'll find that the Carousel program will work if you change it as detailed for the Acorn ATS rom in the Letters of the June issue of *The Micro User*.

Prommer text

I AM delighted with the program Prommer from the June issue of The Micro User. *It is quite superb.*

But when I attempt to call the data file from within View, I can only succeed in setting four markers, after toggling between the Command and Edit screens.

Am I doing something wrong or am I attempting to do something with Prommer for which it is not designed?

Secondly, can Prommer be used to hold Viewstore utilities? – **D.M. Topham, Immingham School, South Humberside.**

● Unfortunately Prommer is not designed to load data into another application program. To do this and run Viewstore applications you would need to store the data in the Rom Filing System – RFS – format.

Spellings spoilt

I BOUGHT SpellMaster soon after it came on sale, and was delighted with its many excellent points – until the quirks appeared. I am using it to proof read the script of a technical book I am completing, a task for which it should be admirable with its easy to build User Dictionary.

Using Control + J and telling it to check the entire text naturally makes it stop at each word not in its dictionary or in my user dictionary. On pressing 3 to correct a word I have misspelt I find that it refuses to accept my user dictionary spelling, but insists on substituting the nearest word it can find in its own dictionary.

*In addition there is a problem if you use *Crossword. I was looking for F-O-- and the*

Turn to Page 122 ►

Win a tenner

● **Want to write to The Micro User? The address is: Letters, The Micro User, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.**

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LETTERS

◀ From Page 121

only word it could find was FLOAT, but there are 27 words in the dictionary that could have filled the conditions.

Even when I gave it a hint and asked it to find FLO--, it still came back with FLOAT out of a choice of 13.

In their leaflet about installing SpellMaster they say it "can be disabled by typing ?(673+n)=0 where n is the ROM number". And that it can be recovered by Break. Is this true? Or am I particularly stupid in failing to make it work? – **Noel Woolf, Brighton.**

● The FLO-- problem has been fixed from version 1.67 onwards. Computer Concepts has advised that the problem with User dictionaries is not a bug but a feature of the fast search algorithm. To disable SpellMaster use *WORKOFF followed by Break.

Prommer potential

THE potentially excellent program, Prommer, listed in the June 1987 issue of The Micro User will not run as it stands. It seems that at least two DEFPROCs are missing from the printed listing. – **David Fleming-Williams, Heswall, Wirral.**

● Unfortunately the turn line was missed from page 59. You will find the rest of the listing starting at page 147 of that issue.

Catalogue catastrophe

IN the July 1986 edition of The Micro User on page 146 there is a program to help D.Cares of Kent who was having trouble with a damaged catalogue.

I keyed it in and ran it to make sure there were no errors in the line listings and my joy turned to dismay when the program totally corrupted a perfectly good catalogue. I wonder if anybody else has had the same problem? – **Anthony Harris, Whetsone, London N20.**

● If the program was typed in as listed it wouldn't have harmed your catalogue. Whenever you have a program that modifies a disc you should always test it on a backup in case something goes wrong.

Challenger option

IN the July issue of The Micro User, M.Garner says that some discs will not run on an Opus Challenger. Most commercial discs can be made to work by use of the *OPT 8 command.

I was most surprised to hear that Opus wouldn't tell him of this: My version of Superior Software's Collection Volume 1 works pefectly once I have typed:

```
*OPT 8  0
*ENABLE CAT
```

This works for most Superior Software and other main software manufacturers but some 40 track discs may also require you to enter:

```
*OPT 8 1
```

Unfortunately I can't get Imogen to work because of a Bad Option. Can anyone help? – **R.Pimlott, Sutton Coldfield, Birmingham.**

● We have had several letters mentioning this – but don't know why Opus never mention it.

£10 Prize letter

Printer code problems solved

MY PRINTER has some different Ascii codes to those used by the BBC Micro, so I wrote this program to provide a simple solution.

The machine code produced is saved on disc (or tape) and can be loaded by typing *PRINTIT (*RUN PRINTIT).

When the program is loaded, you can use the *CODE command to change the Ascii code that the computer will send to the printer. For instance on the BBC Micro the code for a pound sign is 96 whereas on a Epson it is 35 (the BBC Micro's # sign).

It is necessary therefore for the computer to output a 35 Ascii value every time it see a 96. By loading my program and typing *CODE 96,35 the computer will now output a code 35 to the printer (and the screen) every time it sees a 96.

By typing *CODE with no parameters, you can switch it off. The machine code loads in at address &C00 which is not used by most word processors.

And if you have a word processor which allows * commands to be issued from within text you'll be able to swap codes at will. – **Chris Bearman, Gosfield, Essex.**

```
100 REM PRINT IT
110 REM ========
120 FOR L%=0 TO 2 STEP 2
130 P%=&C00:[OPT L%
140 LDA &20F:CMP #&C
150 BEQ Fin:LDA #0
160 STA &72:STA &73
170 LDA #E%MOD256:STA &200
180 LDA #E%DIV256:STA &201
190 LDA &20E:STA &70
200 LDA &20F:STA &71
210 LDA #F%MOD256:STA &20E
220 LDA #F%DIV256:STA &20F
230 .Fin RTS
240 .E% CMP #0:BNE Out
250 STX &72:STY &73
260 .Out RTS
270 .F% PHP:CMP &72
280 BNE Out2:LDA &73
290 .Out2 PLP:JMP (&70)
300 ]:NEXT
310 *SAVE PRINTIT C00+40
```

One-liner improved

I HAVE entered many games from The Micro User, and I much prefer your new type style and I have found the checksums to be a great help.

I recently typed in the Ten Minute Game from the Letters page of the July 1987 issue of The Micro User but found on running it that there was a narrow region down the right hand side of the screen that always remained free of blocks.

By moving to this area the score would steadily increase without me having to do anything. However by increasing the upper limit of the horizontal screen coordinate in the RND statement at the end of the line from 1100 to 1280 it now works very well. – **James Steer, age 10, Stanmore, Middx.**

Disc bytes

CAN you tell me how to find the number of bytes free on a disc and how to detect the differences between files and sub-directories on the ADFS. Is it possible to detect files with ! as the first character? – **Andrew Rojek, Peteborough, Cambs.**

● On the ADFS the free space is found using osbyte &71, which does not work with the DFS. When you read a files catalogue information using osfile with A=5 a file type is returned in A$ as follows:

0	File not found
1	File found
2	Directory found
&FF	Protected file

It is not possible to legally or usefully access a file knowing only its first character.

Printer promise

REMEMBER the fears of endless frustration from printers? The sentimental stories of tormented printer owners, toiling till the early hours in hope of getting the printer to work, before surrendering in utter despair.

Did they forget to switch the printer on, or didn't they realise they had to connect it to the computer?

What happened to all the compatibility complications which were guaranteed to prove fatal? Were they cunningly conceived by the disc drive manufacturers to lead the enthusiastic computer owner to the land of frustration, disaster and fury?

Unlike the unfortunate people in the stories, I had no problems with my printer. I bought an impact dot matrix (yes, the noisy type which

LETTERS

makes everyone go deaf and lose their voice before 60) and started a very interesting hobby.

Packages like Acornsoft's Creative Graphics for only £1.99 gave me pages of dumps to fill my scrapbook.

Even better were games. The better ones with many rooms and screens provided many more dumps.

The hours of enjoyment a printer can bring is superior to a disc drive which only reduces loading and saves time.

I wrote a machine code screen dump (much faster than the printer – and only takes just over a minute) which can shade for different colours, dumping modes 0 to 6 (couldn't be bothered with mode 7) and I wrote machine code interrupts, events and even a user supplied print routine (with VDU 2 continually on) to break out of machine code games to dump the screen (unfortunately most games still overwrite the vectors).

My printer also acts as a typewriter and is used for producing tables, and printing lists as well as all the fantastic pictures in my scrapbook.

If you are at the crossroad don't be afraid, a printer is worth the money. But remember you'll need a screen dump (Watford Electronics' Dumpout 3 looks the best buy).

You also need a lead to connect it up to the computer, Paper (the best is continuous fan-fold with a tractor feed on your printer) and finally a dust cover for the paper and printer.

I hope anyone who buys a printer gets the most out of it they can, and don't be afraid of all the faults people make out they have. – **Mark Ford, Barnsley, South Yorks.**

Return tip

HERE is a tip for machine code programs. Do you ever put sequences in programs such as:

```
JSR FFEE
RTS
```

Why not remove the RTS and replace JSR with JMP? The RTS at the end of the subroutines then replaces the one you had in your program.

If this sort of routine occurs a lot in a program you can save a small, but possibly useful, amount of memory as well as slightly improving the speed of your program. – **Vince Hudd, Henbury, Bristol.**

Getting more from Checksum

THE Checksum utility is a great help when typing in program listings. It let me prove that there was an error in the Master Printer Buffer listing in the July 1987 edition – I might have spent a long time looking for a non-existent typing error if I had not used Checksum.

When used as listed, the Printer Buffer does not work, and merely fills the sideways rams with the number of the ram socket. Nothing is seen at the printer until socket 7 outputs to the printer, when the printer bell sounds in response to the CHR$(7).

The error is in line 4400:

```
4400 LDX Xsto
```

which should actually be:

```
4400 LDA Xsto
```

£10 Prize letter

When using Checksum to check a long program such as Master Printer Buffer, the paged listing option can become tedious, but if unpaged the output can easily fly past the next part that you want to check. I have modified the program so that if a full paged output is not wanted, you are given the option of paging from any particular line. The changed lines are:

```
 350 IF FNyesno VDU14:W%=0
ELSE PRINT:INPUT"PAGE from
line...",W$:W%=VAL W$
 470 N%=B%?1*256+B%?2:IF N
%=W% VDU14
```

If Return is pressed in response to the prompt, no paging takes place, otherwise output is paged from the line specified.

I have further improved the program so that it can be fully loaded and function keys set up simply by chaining the program from disc. It is also not necessary to know the value of PAGE that is in use at the time. This involves these changes (not applicable to Basic I):

```
142 *K.0 PAGE=&7f1f1f1|MOLD-
|MRUN|M
144 *K.10 MODE7|MOLD|M*K.10|M
150 MODE7:IF PAGE<>&7000
OSCLI("K.9PAGE=&7f1f1f1|MLOAD-
""$.CHECKSUM""|MCALL!-
4"):OSCLI("FX138,f1,137"):END
205 PRINT"Press any key-
...":A=GET:CALL!-4
```

– **Howard Snow, Allesley, Coventry.**

Opus challenge

IN the July issue of The Micro User M. Garner mentions incompatibility of software with the Opus Challenger. Shortly before I ordered a Challenger system direct from Opus Supplies. Because of the letter, I spoke at great length to their technical supervisor.

Contrary to M. Garner's experience I found him helpful and reassuring. They are aware of the incompatibility problems between some Superior/Acornsoft programs recently released and this is due to software protection.

But Opus's own software writer is busily engaged on this problem and expects to solve it. The rom will then be updated and offered to existing users either free or for a small nominal charge.

On the strength of this phone call I have let my Challenger order stand. After all, it's been around for 18 months or so and this is the first adverse criticism I've seen.

Of course, the problem would never have arisen if piracy wasn't rampant. In Superior Software Collections there are six excellent games at less than £2 each. Surely there should be no need to copy them. – **Philip Jennings, Longbridge, Birmingham.**

McBrolly explained

I AM very pleased with the Checksum program that you published in the June issue of The Micro User. I used it to check McBrolly and the game worked first time.

Could you please explain why there are red lines at the top of some of the screens. – **D.G.Edwards, East Wittering, W. Sussex.**

● The red lines are levers – pull them to reveal more objects to collect.

Flood failure

WHY, when using the GXR flood fill facilities in Mode 0 & 4, does it only fill about one character row with the selected pattern, then quit? This is shown by:

```
 10 MODE 4
 20 GCOL 0,7
 30 MOVE 0,512 : DRAW
1279,512
 40 GCOL 16,7
 50 PLOT &85,0,716
 60 REM now with solid colour
 70 GCOL 0,7
 80 PLOT &85,0,4
 90 END
```

Yet the same program in MODEs 1, 2 and 5 works perfectly. Is this just one of those unusual Acorn bugs (sorry, features)? Is my GXR rom faulty? Or is it simply that I am not using the GXR commands correctly for this routine to work properly? – **D. Northcott, St. Austell, Cornwall.**

● It's not a bug, feature or fault. It is due to one of the flood fill termination conditions: "The colour being used to fill can itself be filled". Using pattern 16 or 24 in line 40, gives dotted and solid vertical bars in two colour

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LETTERS

◀ From Page 123

modes which means some of the plot pattern can itself be filled so filling stops – but try using pattern 32, this fills perfectly – if slowly.

Bad tips?

WE have received some inquiries for our Pro-Punter software package advertised in the June edition of The Micro User.

Some inquiries are associating us with KBS Software who produced a program called Master Tipster earlier this year.

KBS has now ceased trading, and the Master Tipster was nothing more than a very simple formulator which produced very questionable results. At the time of its release we were in the final stages of a three-year research, development and testing period for our own program.

There have been several complaints to the racing press concerning Master Tipster and they have soured the user market for this type of product.

I would like to disassociate our product from that produced by KBS. – **David Atherton, DGA Software, Ashton-under-Lyne, Lancs.**

Spare part computers

DUE to a collapsing shelf, the keyboard and the clear plastic strip behind it on my BBC Micro, have been irrepairably broken.

Who at Acorn, or any other company, should I contact to obtain replacements. – **Robert Norrington, Lincoln.**

● You'll find that most parts for BBC Micros can be obtained from DRAM Electronics, Unit 12, Kingston Mill, Chestergate, Stockport SK3 0AL. Telephone 061-429 0626.

Pounding the printer

I HAVE found that the # sign will print out the correct £ sign on my Epson printer, but as yet I have not found out how to print out the # sign. – **Duncan Whitrow, Ashton, Bristol.**

● The pound sign is character 35 in the English character set of Epson printers. The # sign on a BBC Micro is character 35, so sending one to the printer results in £ being printed if the English set is selected.

On other character sets, such as USA, character 35 is #, so to print one you need to change character sets either by moving the dip switches or sending some codes to the printer.

The codes you need to send to change to the USA set are 27,82,0 and to return to English use 27,82,3. Try the following Basic program to illustrate this:

```
10 VDU 2
20 FOR I% = 1 TO 5
30 VDU 1,27,1,82,1,0
40 PRINT"Here are some
hashes: ########"
50 VDU 1,27,1,82,1,3
60 PRINT"Here are some
pounds: ########"
70 NEXT
80 VDU 3
```

A right knit

IN the June issue of The Micro User *Mrs.H.Brown asked if anyone had a suggestion of what she could do with a defunct tape – well I have an answer: Knit a very modern sweater out of it.* – **Max Hacking, Tunbridge Wells, Kent.**

● *Elizabeth Dennis replies:* I've made three sample squares with dud tapes which was not very easy as it tends to break. You can use tape with the Knitwear Designer package at the following tensions:

Style	St/inch	Rows/inch	Needles
Loose	5	8	3mm (11)
Tight	7	14	2mm (14)
4-ply	6	10	2¾mm (12)

The latter was the most successful and made quite an interesting effect.

Two warnings though – don't attempt to iron any garment made of tape if you value your iron and be prepared for trouble at airport security.

Database storage

I AM writing a program which uses vast amounts of data and wish to know how to store it in sideways ram on my Master and recall it without wiping out the program. – **David Roberts, Eastleigh, Hamps.**

● Details of how to use the four sideways ram banks as data is in chapter G.7 of the Master Reference Manual Part One. Or you can use the programs from the Ram Arrays article on page 89 of the August issue of *The Micro User*.

Checking the sums

I'M having some trouble with the Checksums program from the June issue of The Micro User. *Instead of four check digits I only get "C%;" and the fifth number is correct but is in decimal not hex.* – **P.J.L. Chapman, Mobberley, Cheshire**

● You have mistaken the tilde (~) character for a quote mark (") in line 530.

ALL programs printed in this magazine are exact reproduction of listings taken from running programs which have been thoroughly tested.

However, on the rare occasions when mistakes occur corrections are published as a matter of urgency. Should you encounter error messages when you type in a program, they will almost certainly be the result of your own typing mistakes.

Unfortunately we can no longer answer personal programming queries concerning these mistakes. Of course letters about suggested errors will be investigated without delay, but any replies found necessary will only appear in the mail pages.

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Ceefax Guide

Software is currently transmitted for a period of one week. Downloading can take place from Friday evening to the following Thursaday evening. As the updating takes place on a Friday, we do not advise attempting to download software between 9am and 7pm on Fridays. The program details given are provisional.

August 7 to 13

Anagram
Produce all the available anagrams from any given text. This invaluable technique can be applied to many situations including solving crossword puzzles.

CRMenu
Automatic disc-menu software to simplify the task of finding a specific file from one of several discs.

6502SP
SPinfo
A utility designed to run from sideways ram, offering 16 extra star commands for owners of the Acorn 6502 second processor. Most of the extra routines can be used without a second processor. The utilities provided include automatic saving of files at regular intervals during development, easy selection of a specific version of Basic, enhanced listing options and many others.

T/ATS11
B/ATS11
The ATS series is designed to help programmers make use of Ceefax pages within their own programs. Part 11 looks at the way in which the source of the teletext signal being received can be identified.

Espionage
Infiltrate the enemy's hidden headquarters to steal the secret formula and destroy their base. A great game from the pages of *The Micro User*.

August 14 to 20

PerCent
Calculate mark-up rates and profit margins. As any retailer will know, to add VAT to the selling price of an item is not as simple as adding on 15%. Similarly, the relationship between percentage markup and the percentage profit is not as straightforward as it may seem. Percent gives an explanation and performs the necessary calculations.

7Card
A computer version of the well-known game of Patience.

DatBase
DBinfo
TestDat
A database system, enabling a collection of records of any format to be processed in a variety of ways. DatBase provides a good introduction to the use of database systems in general.

Compare
A very helpful utility to compare two disc files. The routine will operate with any type of file (Basic, text, machine-code, and so on) and can save disc space by identifying identical files.

WotBaud
Although the rate at which data is sent through the RS423 port can be set using *FX calls, you are required to translate the desired speed into OS call parameters.

WotBaud allows you to set the RS423 receive and transmit rates simply by entering the required speed (or Baud rate) the port is currently set up for (a task that is otherwise not easy to achieve). The program is written to allow simple transfer of the appropriate routines to your own software.

Bach
A musical interlude, demonstrating some of the capabilties of the BBC Micro's sound system.

Prommer
Move your Basic into sideways ram using this excellent utility from the pages of *The Micro User*.

August 21 to 28

Diary
DiaryAR
An electronic daily diary, allowing you to keep a record of past, present and future events. There are a variety of powerful routines for use with the diary entries including a search routine for specific items.

PrntBuf
BufInf
When printing large amounts of text from a program, the computer will stop and wait for the printer to catch up before continuing with the rest of the program. This delay can be avoided by using what is known as a printer buffer. Most of them use sideways ram to store the data being sent to the printer, but this is a problem if you are using SWR for other things, or you don't actually have sideways ram installed. PrntBuf allows you to create a printer buffer anywhere in the computer's main memory.

T/ATS12
B/ATS12
More from our series describing how to use teletext within your own Basic programs. Module 12 studies the inbuilt page-grabbers, and shows how you can select up to 20 different Ceefax pages at once, transferring them all into computer memory simultaneously.

Survive!
Beat the computer in this fast-action, Mode 7 arcade game from the pages of *The Micro User*.

August 29 to September 3

TPrint
TP/inf
Automatically save a series of Ceefax pages to disc, ready to be reloaded and viewed at your own speed. Instant hard-copy of the pages is available at the press of a key, incorporating a printer buffer which allows you to view the next page while the first is being printed.

VidiEd
RVidiEd
VPP
VTE
PRINT
HELP
GUIDE
F–T
The teletext page creation system. This software is the same as that used by Ceefax to create the broadcast teletext pages. As well as the main program, the package includes a Sideways ram or rom version, a page printout routine, a Viewdata interface, an example magazine and a comprehensive user manual. Create magazines of up to 20 teletext pages. These can be linked together or used individually with a carousel routine that displays each page for a pre-set time, cycling through the entire sequence – an ideal feature for displays, exibitions, meetings and so on.

Ram Arrays
Use your sideways ram to store Basic arrays and have more space for your programs. Another very useful utility from the pages of *The Micro User*.

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```
  590 INPUT#X,ln%,wl%
  600 FOR X%=1 TO 61
  610 INPUT#X,tm$(X%)
  620 NEXT
  630 FOR X%=1 TO 50
  640 INPUT#X,pl$(X%),ps(X%),pp(X%),M(X%
),S(X%)
  650 NEXT
  660 INPUT#X,ml%,rt%,ca%,sk%,mn$
  670 CLOSE# X
  680 PROCwk
  690 ENDPROC
  700 DEFPROCsq
  710 ns%=0:FOR X%=1 TO 50:IF S(X%)=1 OR
 S(X%)=2 OR S(X%)=3 ns%=ns%+1
  720 NEXT
  730 ENDPROC
  740 DEFPROCwalkout:C%=0:FOR X%=1 TO 50
  760 IF S(X%)=1 IF RND(rt%)<15 IF RND(1
5)=1 PRINTCHR$134pl$(X%)" has walked out
.":S(X%)=0:C%=C%+1
  770 NEXT:IF C%>0 PROCpr
  790 ENDPROC
  800 DEFPROCew:wa=0:CLS
  830 PRINT CHR$(130);" END OF WEEK"
  840 re=(20-P(1))*1000*(7-Di%)
  850 re=re+RND(10000)-RND(10000):IF re<
100 re=100
  860 IF ven=1 PRINT CHR$129"Gate receip
ts=£";re:ca%=ca%+re
  870 IF ven<>1 PRINT"Playing away from
home.":re=0
  890 wa=0:wa=ns%*400:wa=wa*(5-Di%)
  900 PRINTCHR$132"Wages=£";wa:ca%=ca%-w
a
  910 expense=RND(100)+100:PRINTCHR$129"
Expenses=£";expense
  920 PRINT "Balance=£";re-(wa+expense)
  930 PROCpr:co=co+1:ENDPROC
  960 DEFPROCbr:CLS
  980 PRINT"Due to your excessive spendi
ng the""banks will not pay your bills a
nd so""the club has to close.":PROCpr
  990 DEFPROCfa
 1000 IF rn%=0 OR rn%=9 ENDPROC
 1010 CLS
 1020 IF rn%=7 PRINT CHR$129"The FA Cup
Final"
 1030 IF rn%=6 PRINT CHR$129"The FA Cup
Semi Final"
 1040 PRINT"FA Cup round ";rn%
 1050 PROCpr:Z=sk%:sk%=0+(rn%*2)
 1080 tm$=tm$(60-(rn%*8)+RND(3)-RND(3))
 1090 PROCop
 1100 PROCsl:PROCsc
 1120 X%=0:PROCdi:IF X%=1 GOTO1100
 1130 PROChf:CLS:sk%=Z
 1160 PRINT"Full time result-"
 1170 PRINTtm$(1)SPC1;gl%SPC5tm$SPC1;og%
 1180 IF rn%=7 AND gl%>og% PRINT "YOU H
AVE WON THE FA CUP":ca%=ca%+200000:rn%=8
 1190 IF gl%>og% AND rn%<>7 rn%=rn%+1:PR
INT CHR$(131);"You are through to the ne
xt round"
 1200 IF og%>gl% rn%=0:PRINT CHR$(132);"
You are out of the FA Cup"
 1210 IF gl%=og% PRINT "There is a repla
y hit a key to continue":A$=GET$:GOTO110
0
 1220 PROCpr:PROCew:PROCmu
 1230 IF rn%=8 rn%=0
 1240 ENDPROC
 1250 DEFPROCmu:CLS:*FX15
 1280 PROCsq
 1290 RESTORE 4560
 1300 FOR Z%=1 TO 9:READ opt$
 1320 PRINTCHR$141CHR$130"(";Z%") "opt$
 1330 PRINTCHR$141CHR$134"(";Z%") "opt$
 1340 NEXT:PRINT
 1350 REPEAT Z$=GET$:UNTIL INSTR("123456
789",Z$)>0
 1370 IF Z$="1" PROCsp
 1380 IF Z$="2" PROCsa
 1390 IF Z$="3" wk%=wk%-1:PROCtb:wk%=wk%
+1
 1400 IF Z$="4" PROCln
 1410 IF Z$="5" PROCsk
 1420 IF Z$="6" PROCst
 1430 IF Z$="7" PROCtr
 1440 IF Z$="8" PROCld
 1450 IF Z$="9" ENDPROC
 1460 CLS:GOTO1290
 1470 DEFPROCrt:CLS
 1490 FOR X%=1 TO 16:P(X%)=0:X(X%)=0:NEX
T
 1500 X(1)=1:X(wk%)=1
 1510 FOR X%=1 TO 7
 1520 REPEATx%=RND(16):UNTIL X(x%)=0
 1530 REPEATy%=RND(16):UNTIL X(y%)=0 AND
 x%<>y%
 1540 X(x%)=1:X(y%)=1
 1550 GX%=RND(7-P(x%)):GX%=GX%-RND(7-P(y
%)):IF GX%<0 GX%=0:IF GX%=0 AND RND(5)=1
 GX%=1
 1560 GY%=RND(10-P(y%)):GY%=GY%-RND(7-P(
x%)):IF GY%<0 GY%=0:IF GY%=0 AND RND(3)=
1 GY%=1
 1570 IF RND(10)>8 GX%=RND(6)-1
 1580 IF RND(10)>6 GY%=RND(6)-1
 1590 PRINT CHR$129tm$(x%+((Di%-1)*15))T
AB(18);GX%TAB(22)tm$(y%+(Di%-1)*15)TAB(3
8);GY%
 1600 IF GX%>GY% P1(x%)=P1(x%)+3
 1610 IF GY%>GX% P1(y%)=P1(y%)+3
 1620 IF GY%=GX% P1(y%)=P1(y%)+1
 1630 IF GY%=GX% P1(x%)=P1(x%)+1
 1640 F(x%)=F(x%)+GX%:A(x%)=A(x%)+GY%
 1650 F(y%)=F(y%)+GY%:A(y%)=A(y%)+GX%
 1660 NEXT:PROCpr:ENDPROC
 1680 DEFPROCsl
 1700 REPEAT CLS:PROClp:PROCpicked
 1710 PRINT "P-Pick player  R-Remove pla
yer  E-Exit"
 1730 PRINT'SPC5CHR$130;picked" players
picked"
 1740 REPEAT A$=CHR$(GETAND&5F):UNTIL IN
STR("PRE",A$)>0
 1750 IF A$="P" INPUT"Player number",X%:
X%=X%MOD50:IF S(X%)=2 OR S(X%)=5 S(X%)=1
 1760 IF A$="R" INPUT"Player number",X%:
X%=X%MOD50:IF S(X%)=1 S(X%)=2
 1770 UNTIL A$="E":ENDPROC
 1800 DEFPROCpicked:picked=0
 1820 FOR X%=1 TO 50:picked=picked-(S(X%
)=1):NEXT:ENDPROC
 1850 DEFPROCop:gr%=RND(5)
 1870 oa%=sk%+(15-P(wk%)/2)+RND(5)-8
 1880 od%=sk%+(15-P(wk%)/2)+RND(5)-8
 1890 om%=sk%+(15-P(wk%)/2)+RND(5)-8
 1900 ENDPROC
 1910 DEFPROCsc:df%=0:md%=0:at%=0
 1930 FOR X%=1 TO 16:IF S(X%)=1 df%=df%+
(ps(X%)*M(X%)/100)
 1940 NEXT
 1950 FOR X%=17 TO 34:IF S(X%)=1 md%=md%
+(ps(X%)*M(X%)/100)
 1960 NEXT
 1970 FOR X%=35 TO 50:IF S(X%)=1 at%=at%
+(ps(X%)*M(X%)/100)
 1980 NEXT
 1990 at%=at%+gr%-1:oa%=oa%+gr%-1
 2000 IF gr%=2 at%=at%-3:ottack%=ottack%
-3
 2010 at%=at%+ml%/4:df%=df%+ml%/4
 2030 md%=md%+ml%/4:ENDPROC
 2050 DEFPROCdi:CLS
 2070 IFat%>20at%=20 ELSEIFat%<2at%=2
 2080 IFmd%>20md%=20 ELSEIFmd%<2md%=2
 2090 IFdf%>20df%=20 ELSEIFdf%<2df%=2
 2100 IFoa%>20oa%=20 ELSEIFoa%<2oa%=2
 2110 IFom%>20om%=20 ELSEIFom%<2om%=2
 2120 IFod%>20od%=20 ELSEIFod%<2od%=2
 2130 PRINTTAB(10)tm$(1)TAB(25)tm$
 2140 PRINTCHR$131"Attack",at%oa%
 2150 PRINTCHR$130"Midfield",md%om%
 2160 PRINTCHR$131"Defence",df%od%
 2170 PRINT CHR$(130);"Ground=";
 2180 IF gr%=1 PRINT"Firm"
 2190 IF gr%=2 PRINT"Boggy"
 2200 IF gr%=3 PRINT"Frosty"
 2210 IF gr%=4 PRINT"Icy"
 2220 IF gr%=5 PRINT"Snowy"
```

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```
 2230 IF co MOD 2=0 ven=1 ELSE ven=0
 2240 IF ven=1 PRINTCHR$131"You are play
ing at home" ELSE PRINTCHR$131"You are p
laying away"
 2260 PRINT''CHR$132"Press P to play mat
ch or S to pick team"
 2270 REPEAT Y$=CHR$(GETAND&5F):UNTIL IN
STR("PS",Y$)
 2280 IF Y$="S" GOTO2330
 2310 IF picked>11 Y$="S":PRINT"Try 11 o
r less players now":PROCpr
 2320 IF picked<11 PRINTCHR$135"You have
 to field some inexperienced"CHR$135"re
serves to make up numbers.":ml%=ml%-4:IF
 ml%<0 ml%=0
 2330 IF Y$="S" X%=1
 2340 ENDPROC
 2350 DEFPROCln:CLS:ca%=ca%-ln%
 2390 INPUT"How big a loan do you want"
,loa%
 2400 IF loa%>((5-Di%)*100000) PRINTCHR$
130"The bank will only lend up to £";(5-
Di%)*100000'CHR$130" to a team in divisi
on ";Di%".":GOTO2430
 2410 IF loa%<0 PRINTCHR$130"That's sill
y.":GOTO2430
 2420 ln%=loa%:wl%=ln%*0.02:ca%=ca%+ln%
 2430 PROCpr:ENDPROC
 2450 DEFPROCtr
 2460 IF ns%=18 PRINT''CHR$133"Your squa
d is full":PROCpr:ENDPROC
 2470 CLS:PRINT"Name"SPC9"Skill"SPC6"Pri
ce"
 2480 FOR X%=1 TO 50
 2490 IFX%=1 PRINTCHR$129SPC11"DEFENSE"
 2500 IFX%=17PRINTCHR$130SPC11"MIDFIELD"
 2510 IFX%=35PRINTCHR$131SPC12"ATTACK"
 2520 IF S(X%)=4 PRINTCHR$130;X%CHR$129T
AB(5)pl$(X%)TAB(15)CHR$131;ps(X%)CHR$132
TAB(25)"£";pp(X%)
 2530 NEXT
 2540 PRINT'CHR$132"Type players number
you wish to buy or"CHR$132" 0 to leave
transfer market"
 2550 REPEATINPUTX%:UNTILX%>-1ANDX%<51
 2590 IF X%=0 ENDPROC
 2610 IF S(X%)<>4 PRINTCHR$130pl$(X%)" i
s not for sale":PROCpr:ENDPROC
 2620 INPUT"What will you offer",offer
 2630 IF offer<pp(X%)+RND(10000)-RND(100
00) PRINTCHR$129"Your offer of ";offer"
for "pl$(X%)'CHR$129" has been rejected.
":pp(X%)=pp(X%)+10000:PROCpr:GOTO2470
 2640 IF offer>ca%+ln% PRINTCHR$130"You
don't have enough money":PROCpr:GOTO2470:
 2650 ca%=ca%-offer:PRINTCHR$129pl$(X%)"
 has now joined your squad"
 2670 S(X%)=2:PROCpr:ENDPROC
 2700 DEFPROCwk:PRINT'CHR$129CHR$136"Ple
ase wait a moment...";
 2710 tm$=tm$(wk%+((Di%-1)*15))
 2720 IF rt%>100 rt%=100
 2730 IF rt%<0 rt%=0
 2740 ca%=ca%-wl%*1.2:ln%=ln%-wl%
 2750 IF ml%<4 PROCwalkout
 2760 IF ca%-ln%<-500000 PROCbr
 2770 IF ml%<4 IF RND(rt%)<5 PROCsack
 2780 FOR X%=1 TO 50:IF S(X%)=4 S(X%)=0
 2790 M(X%)=M(X%)+RND(10)-RND(10):Y%=ps(
X%)*M(X%)/60
 2795 pp(X%)=Y%*50000*(5-Di%)+RND(10000)
-RND(10000)
 2800 IF ps(X%)>5 ps(X%)=5
 2805 IF RND(40)=1 AND S(X%)=1 S(X%)=3
 2810 IF M(X%)<0 M(X%)=10
 2820 IF M(X%)>150 M(X%)=150
 2830 IF pp(X%)<4000 pp(X%)=10000
 2850 NEXT
 2860 FOR X%=1 TO RND(10)
 2870 REPEATY%=RND(50):UNTIL S(Y%)=0 OR
S(Y%)=4
 2880 S(Y%)=4:NEXT:FOR X%=1 TO 50
 2900 IF S(X%)=3 M(X%)=M(X%)-5:IF RND(5)
=1 S(X%)=2
 2910 NEXT
 2920 ENDPROC
 2930 DEF PROCsack:CLS
 2950 PRINTCHR$131"Your job is in danger
 due to your lack"CHR$131"of success, t
he Chairman calls you in:"
 2960 X%=RND(rt%):FOR Z=1 TO 1000:NEXT
 2980 IF X%<>1 PRINTCHR$130SPC6"And he t
ells you to improve!":PROCpr:ENDPROC
 2990 PRINTCHR$129SPC10"And he sacks you
!":PROCpr:RUN
 3000 DEFPROCsp:REPEAT CLS:PROClp
 3020 PRINTCHR$129"Type player number to
 be sold"CHR$129" or Return to continue
"
 3030 REPEATINPUTX%:UNTILX%>-1ANDX%<51
 3060 IF X%=0 THEN 3110
 3070 IF S(X%)=0 OR S(X%)=4 PRINTCHR$129
"You do not have "pl$(X%):PROCpr:GOTO311
0
```

This is one of hundreds of programs available FREE for downloading on

MicroLink

In addition to these many BBC Micro programs in the MicroLink library will also run on the Electron.

```
 3080 offer=pp(X%)+RND(10000)-RND(10000)
:PRINTtm$(RND(60)+1)" have offered £";of
fer
 3090 PRINTCHR$129"Do you accept this(Y/
N)":A$=CHR$(GETAND&5F):IF A$<>"Y" pp(X%)
=pp(X%)-10000:GOTO3110
 3100 S(X%)=0:ca%=ca%+offer
 3110 UNTIL X%=0:ENDPROC
 3120 DEFPROCes:CLS:FOR X%=2 TO 16
 3140 IF P(X%)<3 AND Di%<>1 PRINTtm$(X%+
(Di%-1)*15)" are promoted":Y%=RND(16):tm
$=tm$(X%+(Di%-1)*15):tm$(X%+(Di%-1)*15)=
tm$(Y%+(Di%-2)*15):tm$(Y%+(Di%-2)*15)=tm
$
 3150 NEXT:FOR X%=2 TO 16
 3160 IF P(X%)>14 AND Di%<>4 PRINTtm$(X%
+(Di%-1)*15)" are relegated":Y%=RND(16):
tm$=tm$(X%+(Di%-1)*15):tm$(X%+(Di%-1)*15
)=tm$(Y%+(Di%)*15):tm$(Y%+(Di%)*15)=tm$
 3170 NEXT
 3180 IF P(1)>14 AND Di%<>4 PRINT"You ar
e relegated to Division ";Di%+1:Di%=Di%+
1
 3190 IF P(1)<3 AND Di%<>1 PRINT"You are
 promoted to Division ";Di%-1
 3200 IF P(1)<3 ca%=ca%+100000*(5-Di%):I
F Di%<>1 Di%=Di%-1
 3220 rt%=rt%+8-P(1):IF rt%>100 rt%=100
 3230 IF rt%<0 rt%=0
 3240 yr%=yr%+1:PROCpr:ENDPROC
 3260 DEFPROChf
 3270 ch%=RND(md%)-RND(om%*2):IF ch%<1 c
h%=RND(3)
 3280 oc%=RND(om%)-RND(md%*2):IF oc%<1 o
c%=RND(3)
 3290 gl%=RND(at%)-RND(od%):IF gl%>ch% g
l%=ch%
 3300 og%=RND(oa%)-RND(df%):IF og%>oc% o
g%=oc%
 3310 IF gl%<0 gl%=0
 3320 IF og%<0 og%=0
 3330 ENDPROC
 3340 DEFPROCwo
 3350 IF gl%>og% P1(1)=P1(1)+3:ml%=ml%+2
:rt%=rt%+3:IF ml%>20 ml%=20
 3360 IF og%>gl% P1(wk%)=P1(wk%)+3:ml%=m
l%-1:rt%=rt%-2
 3370 IF gl%=og% ml%=ml%-1:rt%=rt%+1:P1(
wk%)=P1(wk%)+1:P1(1)=P1(1)+1
 3380 F(1)=F(1)+gl%:A(1)=A(1)+og%
 3390 F(wk%)=F(wk%)+og%:A(wk%)=A(wk%)+gl
%
 3395 IFml%<0ml%=0 ELSEIFml%>20ml%=20
 3396 IFrt%<0rt%=0 ELSEIFrt%>100rt%=100
 3410 PRINT'CHR$129"The final score is:"
 3420 PRINT'CHR$131tm$(1)SPC1;gl%TAB(20)
tm$SPC1;og%:PROCpr:ENDPROC
 3450 DEFPROCsk:CLS:RESTORE 4550
 3480 FOR Z%=0 TO 9:READ sk$
 3500 PRINTSPC3CHR$141CHR$135;Z%SPC2sk$
 3510 PRINTSPC3CHR$141CHR$134;Z%SPC2sk$
 3520 NEXT:PRINT'TAB(6)CHR$130"What skil
l?";
 3530 REPEAT A$=GET$:UNTILINSTR("0123456
789",A$):PRINTA$;
 3540 sk%=VALA$:ENDPROC
 3550 DEFPROCst:CLS
 3570 PRINTCHR$130"Team picked:"tm$(1)
 3580 PRINTCHR$130"Manager    :"mn$
 3590 PRINTCHR$130"Rating     :";rt%TAB(
17)rt$(rt%DIV10)
 3600 PRINT'CHR$129"Cash=£";ca%
 3610 PRINTCHR$129"Loan=£";ln%
 3620 PRINT'CHR$131"Team morale=";ml%
 3630 PRINTCHR$131"Skill level=";sk%
 3635 PRINT'CHR$134"Division=";Di%
 3640 PRINTCHR$134"Position in league=";
P(1)
 3650 PRINTCHR$134"Number of players in
squad=";ns%
 3660 PRINT'CHR$133"Year=";yr%
 3670 PRINTCHR$133"Week=";
 3680 IF lp%=1 PRINT ;wk%-1 ELSE PRINT ;
wk%-1+15
 3700 PROCpr:ENDPROC
 3720 DEFPROCtb:CLS
 3740 PRINTTAB(8)"Team"TAB(25)"F"TAB(30)
"A"TAB(35)"Pts"
 3750 FOR Y%=1 TO 16:P(Y%)=0:NEXT:B%=1
 3770 FOR Y%=1 TO 16:FOR X%=1 TO 16
 3790 IF P1(X%)>P1(B%) OR P1(X%)=P1(B%)
AND (F(X%)-A(X%)+A(B%)-F(B%)>0) THEN:IF
P(X%)=0 B%=X%
 3800 NEXT:PRINTCHR$132;Y%TAB(4)CHR$129;
 3820 IF B%=1 PRINTTAB(5)CHR$133tm$(1);
ELSE PRINTTAB(6)tm$(B%+((Di%-1)*15));
 3830 PRINT ;CHR$130TAB(25);F(B%)TAB(30)
;A(B%)TAB(35)CHR$131;P1(B%)
 3840 P(B%)=Y%:B%=0:NEXT
 3870 PRINT"You are in position ";P(1)"
after ";:IF lp%=2 PRINT ;15+wk%-1; ELSE
PRINT ;wk%-1;
 3880 PRINT " games":PROCpr:ENDPROC
 3910 DEFPROCda:Z%=RND(-TIME)
 3920 DIM rt$(10),tm$(61),pl$(50),ps(50)
,pp(60),P1(16),X(16),P(16),F(16),A(16),M
(50),S(50)
 3930 Di%=4:P1(0)=-10:ca%=400000:rn%=1
 3940 ln%=0:wl%=0:rt%=20:sk%=6:yr%=1
 3950 ml%=15:ns%=15
```

Turn to Page 130 ▶

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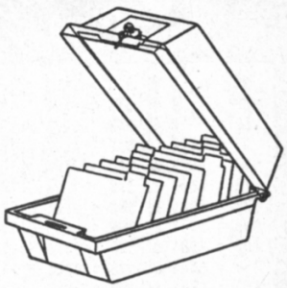

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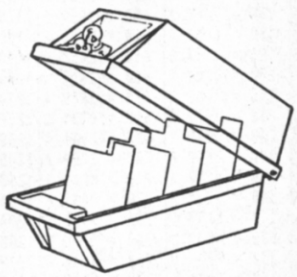

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◀ *From Page 128*

```
 3960 RESTORE 4540
 3970 FOR X%=0 TO 10
 3980 READ rt$(X%):NEXT
 4000 RESTORE 4470:FOR X%=2 TO 61
 4010 READ tm$(X%):NEXT
 4040 RESTORE 4510:FOR X%=1 TO 50
 4060 READ pl$(X%):ps(X%)=RND(5)
 4080 M(X%)=RND(10)+90:NEXT
 4100 FOR X%=1 TO 15:REPEAT
 4110 Y%=RND(50):UNTIL S(Y%)=0
 4120 S(Y%)=1:NEXT:S(Y%)=2
 4150 FORX%=1TO16:P(X%)=X%:NEXT:ENDPROC
 4170 DEFPROClp:CLS
 4190 PRINT"Num Name"SPC6"Skill Form  S
tate  Price"
 4200 FOR X%=1 TO 50
 4210 IF S(X%)=0 OR S(X%)=4 GOTO4300
 4220 IF X%<17 VDU129 ELSEIF X%<35 VDU13
0 ELSE VDU131
 4250 PRINTSPC1;X%TAB(4)pl$(X%)TAB(18);p
s(X%)TAB(21);M(X%);
 4260 IF S(X%)=1 Z$="P" ELSEIF S(X%)=2 Z
$=" " ELSE Z$="I"
 4290 PRINTTAB(26)Z$CHR$133" £";pp(X%)
 4300 NEXT:ENDPROC
```

```
 4320 DEFPROCns:CLS
 4330 PRINT"CHR$129SPC12"NEW SEASON"
 4340 FOR X%=1 TO 50
 4350 ps(X%)=ps(X%)+RND(2)-RND(2):IF ps(
X%)<=0 ps(X%)=1
 4360 IF ps(X%)>5 ps(X%)=5
 4370 M(X%)=RND(50)+50
 4380 IF S(X%)=3 S(X%)=2
 4390 pp(X%)=ps(X%)*50000*(5-Di%):NEXT
 4410 FOR X%=1 TO 16:A(X%)=0:F(X%)=0:P1(
X%)=0:NEXT
 4430 co=1:rn%=1:ENDPROC
 4450 DEFPROCpr:*FX21
 4460 PRINT'CHR$130SPC(5)"Press any key
to continue":A$=GET$:ENDPROC
 4470 DATA Arsenal,Everton,Tottenham,Man
 Utd,Southampton,Chelsea,Liverpool,Notts
 Forest,Newcastle,QPR,Watford,Leicester,
Ipswich,Coventry,Oxford
 4480 DATA Stoke,Blackburn,Barnsley,Port
smouth,Birmingham,Leeds Utd,Man City,Car
lisle,Wimbledon,Charlton,Oldham,Sheffiel
d Utd,Crystal Palace,Cardiff City,Notts
County
 4490 DATA Bradford,Millwall,Rotherham U
td,Hull City,Bristol Rovers,Derby County
,Bournemouth,Walsall,Brentford,Reading,N
ewport,Burnley,Plymouth,Orient,Cambridge
 4500 DATA Chesterfield,Bury,Darlington,
Blackpool,Peterborough,Colchester,Tranme
re,Port Vale,Swindon,Southend,Mansfield,
Stockport,Exeter,Chester,Wrexham,???
```

```
 4510 DATA J.Lukic,R.Clemence,B.Grobbela
ar,P.Shilton,T.Butcher,V.Anderson,D.O'Le
ary,M.Lawrenson,T.Fenwick,A.Peak,G.Rober
ts,A.Martin,T.Cotton,S.Walford,K.Samson,
T.Adams
 4520 DATA G.Rix,B.Robson,G.Hoddle,K.Dal
glish,P.Davis,S.Robson,P.Reid,R.Whelen,J
.Wark,J.Barnes,T.Galvin,G.Mabbut,S.Nicol
,S.Lee,P.Nevin,S.Williams,G.Stracken,J.O
lsen
 4530 DATA T.Woodcock,I.Alison,C.Nichola
s,P.Beardsly,I.Rush,S.Stainrod,D.Speedy,
T.Galvin,P.Walsh,A.Gray,F.Stapleton,M.Ha
tely,G.Linerker,L.Blissett,K.Dixon,C.Wad
dle
 4540 DATA Appalling,Complete failure,Lu
cky to have the job,Very bad,Bad,Poor,Av
erage,Quite Good,Very Good,Excellent,Mov
e over Bobby
 4550 DATA Simple,Easy,Quite easy,Below
average,Average,Above average,Good,Excel
lent,Brilliant,Mega good
 4560 DATA List or sell players,Save gam
e,Print league table,Obtain a bank loan,
Change skill level,Print status,Transfer
 Market,Load new game,Continue game
```

This listing is included in this month's tape & disc offer. See order form on Page 141.

```
  10 =     0 0
  20 =     0 0
  30 =     0 0
  40 = 9ECC C
  50 = BC2B 6
  70 = 4633 2
 100 = 8B0D 0
 130 = 3D37 6
 140 = ADB1 B
 150 = A045 B
 160 = E8B1 8
 170 = 9E4F A
 180 = FC52 4
 190 = 4185 D
 200 = 7DC3 7
 230 = 746F C
 250 = 1079 0
 260 = 1079 1
 270 = 2F10 E
 290 = 45D0 A
 300 = 9205 F
 310 = 8A57 F
 320 = A039 D
 330 = E531 9
 350 = 3D3A C
 360 = BC08 4
 370 = 991E 7
 380 = B40D 2
 390 = 7306 7
 400 = 716A 7
 410 = 2C83 1
 420 = 27F9 4
 430 = 9A76 D
 440 = F140 4
 450 = 2C83 F
 460 = DF04 1
 470 = 2259 7
 480 = 2C83 3
 490 = 6E91 2
 500 = 59F9 C
 510 = ED0F 3
 520 = 7ED2 4
 530 = F49D 1
 540 = E276 0
 550 = 4C1A 4
 560 = 7306 4
 570 = 1F9A 5
 580 = 2C83 D
 590 =  803 9
 600 = 9A76 3
 610 = DEBA D
 620 = 2C83 6
 630 = DF04 6
 640 = B1F2 2
 650 = 2C83 B
 660 = 23D7 5
 670 = 59F9 4
 680 = C131 C
 690 = ED0F A
 700 = 2F0B A
 710 = BEDD 1
 720 = 2C83 F
 730 = ED0F E
 740 = 1270 E
 760 = 513A 7
 770 = 83D2 9
 790 = ED0F B
 800 = 7A11 9
 830 = F276 A
 840 = CE9F 9
 850 = 82BB E
 860 = 4232 A
 870 = B593 8
 890 = F747 6
 900 = CFFA 2
 910 = 9BAA B
 920 = 8F58 5
 930 = FB75 C
 960 =  3B8 B
 980 = 19CE 3
 990 = C1BC 2
1000 = 68CE D
1010 = 7A16 1
1020 =  413 9
1030 = F5AD F
1040 = 6C99 6
1050 = AA70 9
1080 = 2FEE 9
1090 = E8B1 B
1100 = 9E4F A
1120 = D533 1
1130 = 14CC D
1160 = AE0D 2
1170 = 6556 8
1180 = 9D10 8
1190 = 6E14 0
1200 = 539F 3
1210 = 1C8C D
1220 = 4412 B
1230 = BAF3 2
1240 = ED0F B
1250 =  C45 7
1280 = BE8E A
1290 = B637 D
1300 = E536 6
1320 = CF88 2
1330 = 543A 4
1340 = F700 6
1350 = 4CE7 C
1370 = 5379 7
1380 = 9F89 4
1390 =  E56 5
1400 = F0CA B
1410 = F682 0
1420 = DBBC D
1430 = 674D 8
1440 = 5A63 3
1450 = 1024 0
1460 = 2742 E
1470 = AABF 2
1490 = E1E7 8
1500 = A6DF C
1510 = 9CCD 2
1520 = C53B 8
1530 = 451C E
1540 = 30C4 5
1550 = 5E37 B
1560 = 2816 6
1570 = 4731 4
1580 = BC84 3
1590 = 1281 C
1600 = E0D2 E
1610 = D41F F
1620 = AA88 F
1630 =  3AC 3
1640 = DCA3 6
1650 = 774C 6
1660 = D3FE B
1680 = EC97 2
1700 = F43A B
1710 = E4E3 B
1730 = CC27 4
1740 = A15B 0
1750 = EFAA 0
1760 = CAA0 8
1770 = 1A97 0
1800 = 18C0 B
1820 = D810 C
1850 = C4D2 F
1870 =  8BA 3
1880 = 4844 1
1890 = F612 E
1900 = ED0F 2
1910 = 3494 7
1930 = 2B62 6
1940 = 2C83 F
1950 = 69FC E
1960 = 2C83 8
1970 = 8843 B
1980 = 2C83 8
1990 = 242D B
2000 = BBF9 9
2010 = A8DC 1
2030 = 4AFA 4
2050 = 97B3 3
2070 = 3327 7
2080 = 76B5 E
2090 = 48FA 1
2100 = EBDB 1
2110 = 6404 A
2120 = CBCB F
2130 = 539B C
2140 = D95E B
2150 = EDEE E
2160 = 8956 6
2170 = 963F E
2180 = CBE7 9
2190 = 438A 8
2200 = F8A0 B
2210 = 1BFB F
2220 = 6CA5 F
2230 = D7BB 8
2240 = 5A34 1
2260 = 4B2D 7
2270 = BFF6 3
2280 = 8FD5 5
2310 = 20AD 4
2320 = 9981 7
2330 = 8BC4 D
2340 = ED0F F
2350 = 2261 E
2360 = 1053 3
2400 = 1574 A
2410 = C9F1 2
2420 = 3AEB 6
2430 = 8899 F
2450 = 86FF D
2460 = EE93 3
2470 = 27FF C
2480 = DF04 4
2490 = C02A 3
2500 = DA47 A
2510 = F8AB 3
2520 = 1D82 1
2530 = 2C83 4
2540 = FD93 9
2550 = D454 9
2590 = B4C1 B
2610 = D176 4
2620 = 4223 E
2630 = B212 5
2640 = 603A 7
2650 = 3C40 C
2670 = D333 4
2700 = AC52 9
2710 = E46F 2
2720 = C087 6
2730 = 1DD6 A
2740 = B366 1
2750 = B0E2 A
2760 = 12CA 6
2770 = 1CBA E
2780 = D1D6 1
2790 = 524D 1
2795 = D600 C
2800 = 21E1 0
2805 = A187 6
2810 = 7973 2
2820 = 135D A
2830 = 9BC0 F
2850 = 2C83 E
2860 = B61B 1
2870 = 6F3E 2
2880 = 31C4 3
2900 = 248E 0
2910 = 2C83 A
2920 = ED0F 0
2930 = D898 5
2950 = 8BA9 A
2960 = 1699 9
2980 = E761 D
2990 = 2208 B
3000 = 948C 1
3020 = 5FB6 B
3030 = D454 7
3060 = 35B3 1
3070 = CB2B D
3080 = F6D4 F
3090 = ECB4 B
3100 = 1751 E
3110 = F4B1 A
3120 = EECB 9
3140 = 1767 F
3150 = 70D8 3
3160 = 933A A
3170 = 2C83 7
3180 = 6A6A 9
3190 = A417 C
3200 = 69EB 3
3220 = F804 6
3230 = 1DD6 8
3240 = AA66 D
3260 = 9254 5
3270 = A3F9 6
3280 = 988B 2
3290 = 7BCB A
3300 = AEB7 5
3310 = A651 F
3320 = E369 E
3330 = ED0F F
3340 = 1030 5
3350 = 3EE7 F
3360 =  3B7 3
3370 =  25C C
3380 = 1B90 A
3390 = B3DF 5
3395 = E0A7 8
3396 = 3F6F C
3410 = 7A20 E
3420 = D8B8 2
3450 = A7A1 5
3480 = B6AC F
3500 =  151 B
3510 = EA72 5
3520 = 78FE F
3530 = 3E74 8
3540 = 2CA8 7
3550 = DC0B A
3570 = 4B3C E
3580 = 3AF3 A
3590 = 4BF6 F
3600 = 2D2F 8
3610 = A965 8
3620 = 1B52 2
3630 = 311E 2
3635 = 5EB4 9
3640 = 3195 2
3650 = A7EF 0
3660 = A28E D
3670 = 9381 C
3680 = FC94 2
3700 = 8899 1
3720 = 7CE5 1
3740 = 1AFD 2
3750 = EB78 E
3770 = 9299 B
3790 = 90DD D
3800 = B29B 4
3820 =  B83 5
3830 = FDF7 1
3840 = DC67 A
3870 = BCF3 8
3880 =  4E1 3
3910 = 1E6A E
3920 = 3C27 0
3930 = 7F87 F
3940 = E4F5 8
3950 = 54A6 5
3960 = B6DF F
3970 = 5660 0
3980 = 74F6 9
4000 = 350D F
4010 = 4AC3 F
4040 = 1BA5 8
4060 = 1C50 C
4080 = AD93 2
4100 = 3178 0
4110 = B2D6 D
4120 = 48EE 5
4150 =  43B B
4170 = CF82 A
4190 = 40D9 7
4200 = DF04 E
4210 = EAB3 A
4220 = A6E5 7
4250 = 489C 7
4260 = 8FC1 6
4290 = 66AC 7
4300 = E531 9
4320 = 7BBA E
4330 = 7327 8
4340 = DF04 6
4350 = 402A 4
4360 = 21E1 B
4370 = 94F1 C
4380 = EA7E B
4390 = 5BBB 2
4410 = D131 E
4430 = CEB3 D
4450 = 1078 7
4460 = 9E9F E
4470 = 87AB 6
4480 = 6758 5
4490 = E365 4
4500 = B32C 5
4510 = 2A88 F
4520 = DD94 D
4530 = D60C C
4540 = F6DE 8
4550 = 2166 B
4560 = 9126 B
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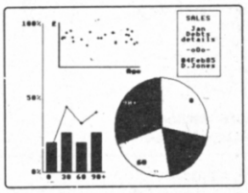

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```
 590 .right
 600 CMP #137:BNE down
 610 LDA #1:BPL more
 620 .down
 630 CMP #138:BNE copy
 640 LDA #4
 650 .more
 660 CLC:ADC fileno
 670 CMP files:BCS searchkey
 680 STA fileno
 690 .newfile
 700 LDA #131:JSR oswrch
 710 JMP copyfiles
 720 .copy
 730 CMP #135:BNE savefiles
 740 JSR load
 750 JMP copyfiles
 760 .savefiles
 770 CMP #64:BNE searchkey
 780 LDA #131:JSR oswrch
 790 JSR save
 800 JMP copyfiles
 810 :
 820 .initialise
 830 LDA #0:STA track+1:STA sector+1
 840 :STA fileno
 850 LDA #22:JSR oswrch
 860 LDA #7 :JSR oswrch
 870 LDA #4:LDX #1:JSR osbyte
 880 .clearbuff3
 890 LDA #0:LDX #&7F
 900 .loop3
 910 STA buffer3,X:DEX:BPL loop3
 920 LDA #name MOD256:STA param
 930 LDA #name DIV256:STA param+1
 940 .setpointer
 950 LDA #0:STA start:STA bytes
 960 LDA #&11:STA start+1
 970 LDA #&6B:STA bytes+1
 980 RTS
 990 :
1000 .readcat
1010 LDA adrive:STA drloc1:STA drloc2
1020 LDX #0:STX &71
1030 LDA #buffer1 DIV256:STA &72
1040 DEX:STX &70:STX &73:STX &74
1050 LDA #3:STA &75
1060 LDA #&53:STA &76
1070 .track
1080 LDA #0:STA &77
1090 .sector
1100 LDA #0:STA &78
1110 LDA #&22:STA &79
1120 LDA #&7F:LDX #&70:LDY #0
1130 JMP osword
1140 :
1150 .displaycat
1160 LDA #12:JSR oswrch
1170 LDX fileno:JSR getscreenpos
1180 LDA #8:STA get+1
1190 LDA #buffer1 DIV256:STA get+2
1200 LDA buffer2+5
1210 LSR A:LSR A:LSR A
1220 TAX:STX files
1230 .loop4
1240 LDA #131:JSR oswrch
1250 .carryon
1260 LDY #7:JSR get
1270 AND #&7F:JSR oswrch
1280 LDA #ASC".":JSR oswrch
1290 .filename
1300 LDY #0
1310 .loop5
1320 JSR get
1330 CMP #32:BCS ok
1340 LDA #ASC"?"
1350 .ok
1360 JSR oswrch
1370 INY:CPY #7:BNE loop5
1380 .nextname
1390 STA flag
1400 DEX:BEQ endcat
1410 LDA get+1:CLC:ADC #8:STA get+1
1420 INC fileno
1430 LDA flag:BMI carryon
1440 BPL loop4
1450 .endcat
1460 LDA #0:STA fileno
1470 RTS
1480 :
1490 .get
1500 LDA buffer1,Y:RTS
1510 :
1520 .getscreenpos
1530 TXA
1540 LSR A:LSR A
1550 TAY:INY:INY:STY ypos
1560 ASL A:ASL A:STA xpos
1570 TXA:SEC:SBC xpos
1580 ASL A:STA xpos
1590 ASL A:ASL A:CLC:ADC xpos:STA xpos
1600 .setcursor
1610 LDA #31:JSR oswrch
1620 LDA xpos:JSR oswrch
1630 LDA ypos:JMP oswrch
1640 :
1650 .load
1660 LDA #129:JSR oswrch
1670 JSR fetchname
1680 LDA fileno:TAX
1690 ASL A:TAY
1700 LDA start:STA param+2
1710 STA address,Y:INY
1720 LDA start+1:STA param+3
1730 STA address,Y
1740 LDA #&FF:STA buffer3,X
```

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```
1750 LDX #param MOD256
1760 LDY #param DIV256
1770 JSR osfile
1780 LDA length:CLC:ADC start:STA start
1790 LDA length+1:ADC start+1:STA start
+1
1800 LDA bytes:SEC:SBC length:STA bytes
1810 LDA bytes+1:SBC length+1:STA bytes
+1
1820 LDX #0
1830 .loop6
1840 LDA buffer3,X:BNE nexta
1850 TXA:ASL A:ASL A:ASL A
1860 ADC #12:TAY
1870 LDA bytes:CMP buffer2,Y:INY
1880 LDA bytes+1:SBC buffer2,Y
1890 BCS nexta
1900 INC buffer3,X
1910 JSR getscreenpos
1920 LDA #132:JSR oswrch
1930 .nexta
1940 INX:CPX files:BNE loop6
1950 LDX fileno
1960 .loop7
1970 LDA buffer3,X:BEQ filefound
1980 INX:CPX files:BNE loop7
1990 LDX fileno:BEQ save
2000 LDX #0:STX fileno:BEQ loop7
2010 .filefound
2020 STX fileno
2030 RTS
2040 :
2050 .save
2060 LDA start:BNE beginsave
2070 LDA start+1:CMP #&11:BNE beginsave
2080 RTS
2090 .beginsave
2100 LDA bdrive:STA drloc1:STA drloc2
2110 LDX #0
2120 .loop8
2130 LDA buffer2,X:STA buffer4,X
2140 INX:BNE loop8
2150 STX xpos:LDA #23:STA ypos
2160 JSR setcursor
2170 LDX #m3 MOD256:LDY #m3 DIV256
2180 JSR message
2190 JSR getkey
2200 LDX files:DEX:STX xtemp
2210 .loop9
2220 LDA buffer3,X:BPL reset
2230 CMP #&FF:BNE reset
2240 DEC buffer3,X
2250 JSR getscreenpos
2260 LDA #9:JSR oswrch
2270 JSR fetchname
2280 LDA xtemp:ASL A:TAY
2290 LDA address,Y:STA param+10:INY
2300 LDA address,Y:STA param+11:DEY
2310 TYA:ASL A:ASL A:ADC #8:TAY
2320 LDA buffer4,Y:STA param+2:INY
2330 LDA buffer4,Y:STA param+3:INY
2340 LDA buffer4,Y:STA param+6:INY
2350 LDA buffer4,Y:STA param+7:INY
2360 LDA buffer4,Y:ADC param+10
2370 STA param+14:INY
2380 LDA buffer4,Y:ADC param+11
2390 STA param+15
2400 LDX #param MOD256
2410 LDY #param DIV256
2420 LDA #0:JSR osfile
2430 JMP nextsave
2440 .reset
2450 BEQ nextsave:BMI nextsave
2460 DEC buffer3,X
2470 JSR getscreenpos
2480 LDA #131:JSR oswrch
2490 .nextsave
2500 DEC xtemp:LDX xtemp:BPL loop9
2510 LDA #7:STA xpos:LDA #23:STA ypos
2520 JSR setcursor
2530 LDX #m4 MOD256:LDY #m4 DIV256
2540 JSR message
2550 JSR getkey
2560 LDA #0:STA xpos
2570 JSR setcursor
2580 LDX #40:LDA #32
2590 .loopa
2600 JSR oswrch:DEX:BNE loopa
2610 JMP setpointer
2620 :
2630 .getkey
2640 LDA #21:LDX #0:JSR osbyte
2650 JSR osrdch:BCS keyerr:RTS
2660 .keyerr
```

Turn to Page 134 ▶

◀ *From Page 133*

```
2670 CMP #27:BNE getkey
2680 LDA #&7E:JSR osbyte
2690 LDA #4:LDX #0:JSR osbyte
2700 LDA #0:STA xpos:LDA #22:STA ypos
2710 JSR setcursor
2720 LDX stack:TXS
2730 RTS
2740 :
2750 .fetchname
2760 LDY #0:STY ytemp:STY param+6
2770 .loopb
2780 LDA #135:JSR osbyte
2790 LDY ytemp:TXA:STA name,Y
2800 JSR oswrch
2810 INY:STY ytemp
2820 CPY #9:BNE loopb
2830 LDA #13:STA name,Y
2840 RTS
2850 :
2860 .getdrives
2870 LDA #0:STA xpos:LDA #5:STA ypos
2880 JSR setcursor
2890 LDX #m1 MOD256:LDY #m1 DIV256
2900 JSR message
2910 .getdrivea
2920 JSR getkey
2930 CMP #48:BCC getdrivea
2940 CMP #52:BCS getdrivea
2950 JSR oswrch:AND #3:STA adrive
2960 JSR osnewl
2970 LDX #m2 MOD256:LDY #m2 DIV256
2980 JSR message
2990 .getdriveb
3000 JSR getkey
3010 CMP #48:BCC getdriveb
3020 CMP #52:BCS getdriveb
3030 JSR oswrch:AND #3:STA bdrive
3040 RTS
3050 :
3060 .displaymenu
3070 LDY #0:STY xpos:LDA #15:STA ypos
3080 JSR setcursor
3090 LDX #menu MOD256:LDY #menu DIV256
3100 :
3110 .message
3120 STX loopc+1:STY loopc+2
3130 LDY #0
3140 .loopc
3150 LDA &FFFF,Y:BEQ out
3160 JSR oswrch:INY:BNE loopc
3170 .out
3180 RTS
3190 :
3200 .m1
3210 OPT FNEQUS("Source       drive ")
3220 OPT FNEQUB(0)
3230 .m2
3240 OPT FNEQUS("Destination drive ")
3250 OPT FNEQUB(0)
3260 :
3270 .menu
3280 OPT FNEQUS(" COPY=LOAD       @=SAVE
     ESCAPE=END")
3290 OPT FNEQUB(0)
3300 :
3310 .m3
3320 OPT FNEQUB(7)
3330 OPT FNEQUS("Insert destination dis
c and press key")
3340 OPT FNEQUB(0)
3350 .m4
3360 OPT FNEQUB(7)
3370 OPT FNEQUS("  source   ")
3380 OPT FNEQUB(0)
3390 ]:NEXT
3400 *SAVE copier 880 CFF
3410 END
3420 :
3430 DEF FNEQUS(A$)
3440 $P%=A$
3450 P%=P%+LEN(A$)
3460 =pass
3470 :
3480 DEF FNEQUB(A%)
3490 ?P%=A%
3500 P%=P%+1
3510 =pass
```

This listing is included in this month's tape & disc offer. See order form on Page 141.

```
 10 =     0 0
 20 =     0 0
 30 =     0 0
 40 =     0 0
 50 =     0 0
 60 = 6BA1 1
 70 = C8E7 E
 80 = FE7F D
 90 = BC36 7
100 =   55F C
110 = 9F1A 2
120 = AE70 C
130 = 518F 9
140 = 48F0 E
150 = D96D 0
160 = 8334 C
170 = AD88 0
180 = F64C 7
190 = DB61 0
200 =   E4B 9
210 = 77B6 5
220 = 4E48 6
230 = D11D 1
240 = 516E A
250 =   F20 C
260 = BC85 7
270 = 41D3 B
280 = 37F5 9
290 = 2220 5
300 = 537F D
310 = 5D54 F
320 = 3311 1
330 = F001 1
340 = F8A4 6
350 = A963 0
360 = 9843 C
370 = 8D73 8
380 = 925A A
390 = A4EC 8
400 = CC8D 3
410 = B51C 3
420 = ADF4 3
430 = DE6B B
440 = DD23 6
450 = 9170 0
460 = 45F3 8
470 = 14FC B
480 = DA34 4
490 = 60FB E
500 = B299 B
510 = 854E F
520 = 895C 5
530 = A355 C
540 =   372 9
550 = F001 C
560 = 582C 4
570 = 8ED1 4
580 = 5E8C A
590 = E460 1
600 = 1F53 3
610 = 45A3 C
620 = FFC3 D
630 = E38E F
640 = 4211 3
650 = 422A A
660 = E9EA D
670 = 9D13 2
680 = A830 5
690 =   B55 5
700 = A355 9
710 = 1939 2
720 = 55AF D
730 = EFC7 E
740 = 135A 6
750 = 1939 9
760 = 5F8D 1
770 =    E0 7
780 = A355 5
790 = 4DD7 E
800 = 1939 5
810 = 9719 A
820 = 5B39 C
830 = 959C 2
840 = 554A 1
850 = E9F1 F
860 = 9885 F
870 = A610 E
880 = 6354 A
890 = F7AD 6
900 = 1353 D
910 = ACC7 6
920 = 66EC 1
930 = 2129 F
940 = 5D56 D
950 = 730B 4
960 = 817C E
970 = 769D C
980 = 9843 7
990 = 9719 2
1000 = F97F 9
1010 = 537F 2
1020 = 78C9 4
1030 = E63A 6
1040 =   B8A 1
1050 = 96A2 8
1060 = B668 0
1070 = A1D9 2
1080 = 9BA4 2
1090 = 6E8E 6
1100 = 6A4B 2
1110 = B05E 7
1120 = 843D 9
1130 = CDF7 A
1140 = 9719 B
1150 = 4B84 8
1160 = 2654 9
1170 = AC44 8
1180 =   808 9
1190 = 6D67 E
1200 = A5AD 1
1210 = 931A 4
1220 = 9E45 7
1230 = 63B4 F
1240 = A355 2
1250 = B2A4 7
1260 =   26E D
1270 = 1671 1
1280 = 61C9 A
1290 = 39F8 A
1300 = 9CF1 E
1310 = 7395 3
1320 = 221E 2
1330 = 751D 0
1340 = CB08 5
1350 = 5B1E 8
1360 = 9224 0
1370 = 7E95 3
1380 = C767 E
1390 = BB5F D
1400 = 3B7F 9
1410 = D237 A
1420 = 9BA7 6
1430 = F256 9
1440 = 3E4A 5
1450 = C103 A
1460 = 472B B
1470 = 9843 F
1480 = 9719 9
1490 = 4123 F
1500 = F7CB 2
1510 = 9719 0
1520 = 70C5 8
1530 = 5DFD 2
1540 = 877D E
1550 = 949E E
1560 = A12A 9
1570 = 24B7 F
1580 = F186 9
1590 =   323 B
1600 = C26A 3
1610 = A90D 3
1620 = CA51 1
1630 = CB82 2
1640 = 9719 7
1650 = 729F F
1660 = FD9E B
1670 =   236 4
1680 = C272 F
1690 = 8530 A
1700 = 9F68 3
1710 = 5952 4
1720 = 8659 F
1730 =   66A 3
1740 = B325 3
1750 = 1B97 8
1760 = B39C 5
1770 = 8D36 3
1780 = 7E0A 6
1790 = B016 1
1800 = 7F24 1
1810 = BB90 C
1820 = EA45 9
1830 = 43F6 6
1840 = 7205 3
1850 =   A35 8
1860 = ED1E 2
1870 = F438 2
1880 = 97A1 6
1890 = 5A56 6
1900 = 4B3E E
1910 = B51C 9
1920 = A6CA 0
1930 = 4FFB 3
1940 = 8843 D
1950 = 5D54 6
1960 = 53D7 4
1970 = 1266 4
1980 = 9862 7
1990 = 8634 1
2000 = F29C 3
2010 = E517 9
2020 = CC8D 4
2030 = 9843 8
2040 = 9719 2
2050 = 2C12 9
2060 = 93DB 4
2070 = 7553 A
2080 = 9843 E
2090 = 7B63 4
2100 = 3EC3 C
2110 = EA45 D
2120 = A238 8
2130 = C716 D
2140 = 24AC 4
2150 = 41C0 D
2160 = 7E06 A
2170 = 56C0 4
2180 = CD92 B
2190 = B821 7
2200 = 9C94 F
2210 = B219 A
2220 = F73A B
2230 = 1AF5 F
2240 = 1E9D E
2250 = B51C 9
2260 = 65E2 A
2270 =   236 0
2280 = F908 9
2290 = BB84 E
2300 = 8F7E 4
2310 = 41D7 3
2320 =   6DE 3
2330 = AC8F 7
2340 = 8FD8 B
2350 = 2589 8
2360 = D4E0 0
2370 = 5613 7
2380 = C4C1 0
2390 = 9594 B
2400 = 1B97 8
2410 = B39C 4
2420 = 622D 9
2430 =    63 B
2440 = 42AD 0
2450 = 66BC A
2460 = 1E9D 6
2470 = B51C 2
2480 = A355 0
2490 = 3ACF 4
2500 =   6A1 3
2510 = 7A56 D
2520 = 7E06 9
2530 = A49E 0
2540 = CD92 9
2550 = B821 1
2560 = 106C 5
2570 = 7E06 E
2580 = 6EF6 C
2590 = 69E4 6
2600 = B3CC E
2610 = C36E 5
2620 = 9719 6
2630 =   9D3 C
2640 = FCAD A
2650 = B0D5 D
2660 =   B38 A
2670 = 6D19 4
2680 = 8537 4
2690 = A565 B
2700 = 7F21 1
2710 = 7E06 C
2720 = 734A 0
2730 = 9843 F
2740 = 9719 6
2750 = BE5A 8
2760 = 9464 F
2770 = 5987 E
2780 = B2DB C
2790 = 719D 2
2800 = 9224 6
2810 = D477 D
2820 =   B39 A
2830 = 5BD5 E
2840 = 9843 9
2850 = 9719 F
2860 = B34C 4
2870 = B8BA C
2880 = 7E06 5
2890 = 719F F
2900 = CD92 C
2910 = 813F C
2920 = B821 9
2930 = 449F F
2940 = D31A 0
2950 = 7544 5
2960 = 3334 5
2970 = CD7F 6
2980 = CD92 E
2990 = B15C 9
3000 = B821 6
3010 = 74FC 2
3020 = E379 B
3030 = BBA4 A
3040 = 9843 D
3050 = 9719 5
3060 = C1BF E
3070 = EA64 0
3080 = 7E06 C
3090 = 4435 0
3100 = 9719 0
3110 = 8868 9
3120 = 7A18 A
3130 = 9CF1 E
3140 = 49A6 A
3150 = 4422 2
3160 = 1E64 1
3170 = EBF1 6
3180 = 9843 3
3190 = 9719 2
3200 = C6C3 7
3210 = A638 8
3220 =   1DD 8
3230 = F6A0 9
3240 = D6F5 8
3250 =   1DD A
3260 = 9719 D
3270 = D1C4 1
3280 = 4B98 4
3290 =   1DD 5
3300 = 9719 0
3310 = E681 0
3320 = 984A A
3330 = A82F C
3340 =   1DD A
3350 = 9666 4
3360 = 984A 6
3370 =   D34 B
3380 =   1DD 6
3390 = DA42 0
3400 = AFF4 2
3410 = FD2E E
3420 = 9719 E
3430 = CDFA F
3440 = 707F 0
3450 =   F5A B
3460 = D044 4
3470 = 9719 4
3480 = 50C0 4
3490 = B978 5
3500 = 5569 8
3510 = D044 2
```

Get knitting on your micro with

Knitwear Designer

Now you can use your BBC Micro or Electron to design perfectly-fitting knitwear – then print out the complete pattern.

It's the biggest development since the home knitting machine – and it's so simple to use. Now anyone can use a computer to design knitwear to individual measurements and then produce row-by-row knitting instructions on the printer.

YOU CAN:

- **Work with any yarn, from fine cottons to chunky wools**
- **Enter your natural tension and the pattern adjusts to the way you knit**
- **Select from three preset patterns – Raglan sleeve, drop and square shoulder**
- **Use the Freehand program to produce custom designs**

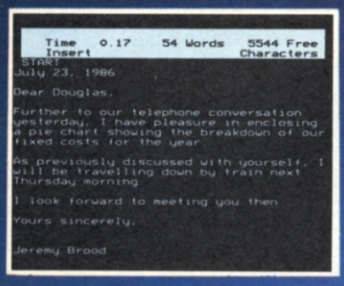
Say goodbye to badly-fitting home knitting. With one of the five programs included in the package, and using the clearly written manual, you can produce perfect results every time.

To order please turn to the form on Page 141

£8.95
Cassette
Also available on disc for use on the Advanced Plus 4 and Slogger SEDFS.
£9.95
5¼″ disc

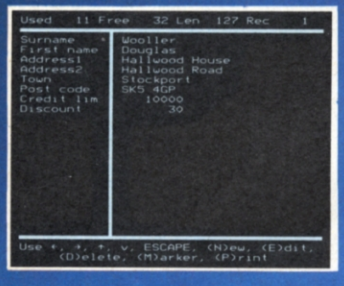
DATABASE PUBLICATIONS

All this in just



WORD PROCESSOR

Compose a letter, set the print-out options using embedded commands or menus, use the mail merge facility to produce personalised circulars – and more!



DATABASE

Build up a versatile card index, use the flexible print out routine, do powerful multi-field sorting, perform all arithmetic functions, link with the word processor – and more!

LABEL PRINTER

Design the layout of a label with the easy-to-use editor, select label size and sheet format, read in database files, print out in any quantity – and more!

...and at a price

Mini Office II is a comprehensive integreated suite of programs setting a new standard in home and business software.

These sample screenshots illustrate just a few of the wide range of features, many of which are usually only available on software costing hundreds of pounds. Most are easily accessed by using cursor keys to move up and down a list of options and pressing Return to select.

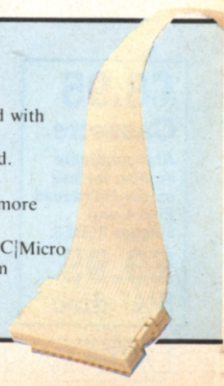
Mini Office II takes over where the original, highly successful Mini Office left off, with numerous extra features, two additional modules, a program to convert existing Mini Office files to Mini Office II format, and a 60 page, easy to follow manual.

And it's at a price everyone can afford!

DATABASE SOFTWARE **Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY**

Now available on a power-packed rom board!

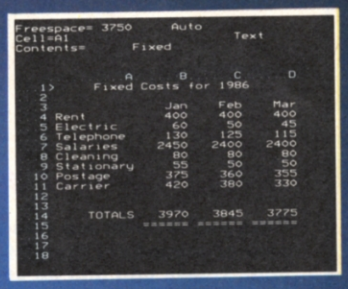
- Four 32k roms on one board packed with 128k of super fast machine code.
- Easy to install – no soldering needed.
- Split second application selection.
- Frees valuable ram space for much more data.
- Fully compatible with the whole BBC Micro range, Aries or Watford shadow ram board, and tape, DFS, ADFS and ECONET filing systems.



ONE package!

SPREADSHEET

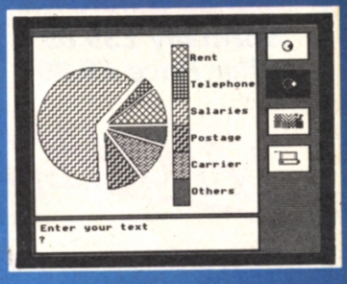
Prepare budgets or tables, total columns or rows with ease, copy formulae absolutely or relatively, view in either 40 or 80 column modes, recalculate automatically – and more!



MASTER DISC NOW AVAILABLE!

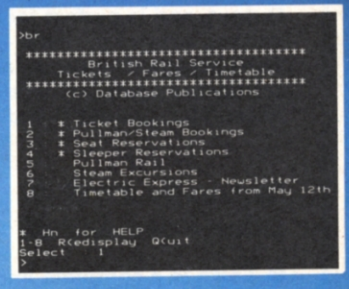
GRAPHICS

Enter data directly or load data from the spreadsheet, produce pie charts, display bar charts side by side or stacked, overlay line graphs – and more!



COMMS MODULE

Using a modem you can access services such as MicroLink and book rail or theatre tickets, send electronic mail, telex and telemessages in a flash – and more!



that can't be matched!

Mini Office II	
BBC B, B+	
Cassette	£14.95
5¼" disc	£16.95
MASTER	
5¼" disc	£19.95
COMPACT	
3½" disc	£21.95
INSTANT MINI OFFICE II	
On rom for full BBC range	£59.95

Turn to order form on Page 141

THE MICRO USER MAIL ORDER OFFERS

Amazing Acornsoft bargains

GAMES

THREE tapes for the price of ONE!

Revs and Aviator are two of the best simulations ever produced for the BBC Micro. And with Revs Four Tracks you will be able to experience the excitement of driving around some of Britain's most renowned racing circuits.

Games Galore
Normally £39.85
Offer Price £9.95

Save £30!

LANGUAGES

Powerful roms pack a punch

● **BCPL is the most flexible of modern structured languages and is the easiest to learn. It is particulary good at handling Input and Output, and is perfect for writing utilities, screen editors, control systems – even games software. The package includes a language rom, a disc containing compiler, screen editor, 6502 Assembler, utilities – and a 450 page User Guide.**

BCPL Bundle
Normally £109.70
Offer Price £29.95

Save £80!

● **Forth is a complete implementation of the 1979 standard specification. It is a compiled language which typically runs five times faster that Basic, and this rom version gives full error messages, making it ideal for beginners and enthusiasts alike.**

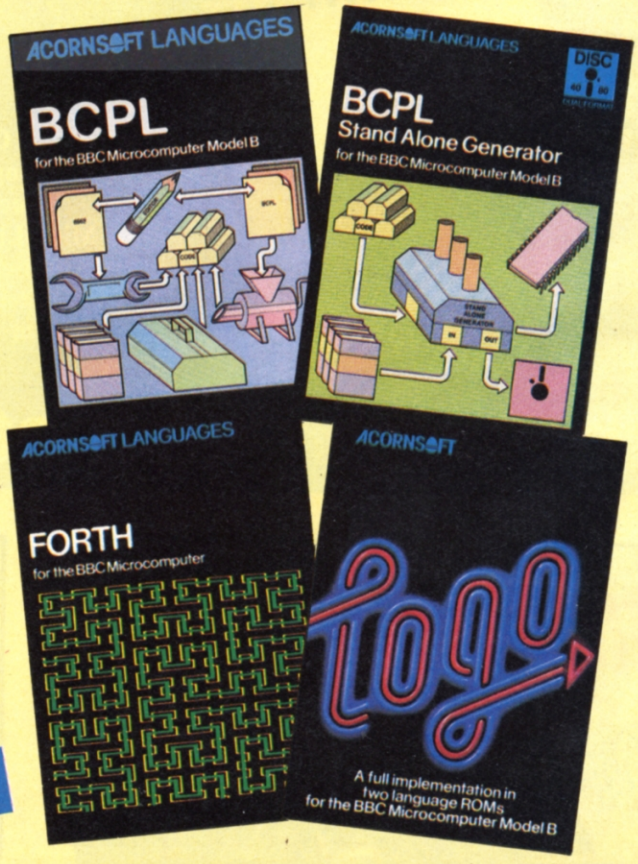
Normally £49.85
Offer Price £19.95

Save £30!

● **Acornsoft Logo is a full implementation of the Logo language widely used in schools. Special features include multiple screen turtles, extensive sound and graphics commands, and list processing facilities. The package includes two roms, three manuals, a reference card, one disc and a cassette.**

Normally £69.00
Special offer £29.95

Save £39!



THE MICRO USER MAIL ORDER OFFERS

MUSIC

Make your micro sound sensational!

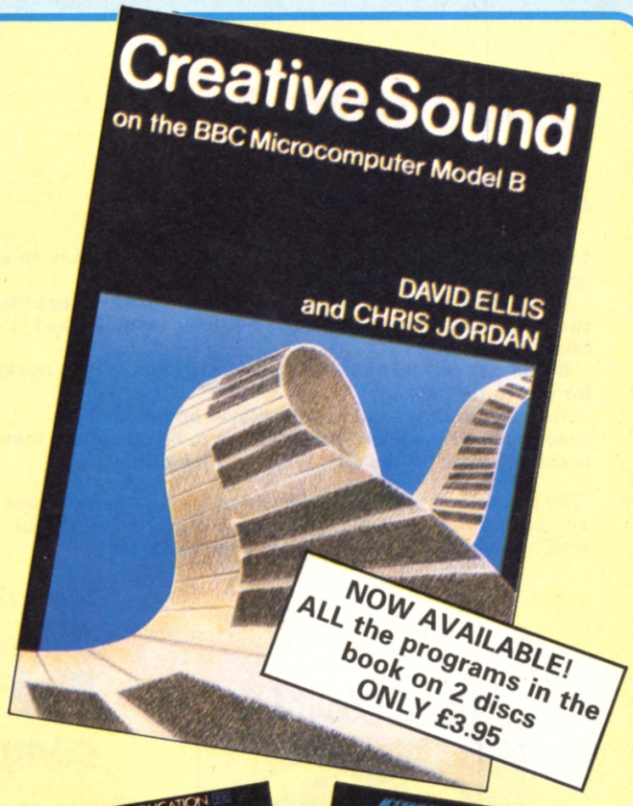
Creative Sound is a beautifully presented 320 page book, packed with everything you need to know about music on the BBC Micro.

The authors are musician, composer and programmer David Ellis, and Chris Jordan, who designed the BBC Micro's sound system as well as the Acorn Music 500 and 5000.

There are more than 30 program listings, including programmable synthesisers, sequencer, music compiler, example tunes, Mozart's Musical Dice Game, composition aids, pitch trainer, scales program – and sound effects galore.

Creative Sound
Normally £9.95
Offer Price £4.95

Save £5!



EDUCATION

For the younger micro user . . .

- ABC is a unique writing tool for seven year olds and upwards, designed to be easily operated and quickly understood.
- Spooky Manor is an adventure game for up to four players that encourages planning and logical thinking.
- In Talkback you can hold conversations with the computer by typing in sentences – and even create your own computer characters.
- Drill, cut, squash and paint your creations using the machines in the Workshop. Suitable for children from the age of three upwards.

Previously each package cost £9.95 – now you can buy all four tapes together for the same price.

Educational extravaganza
Normally £39.80
Offer price £9.95

Save £30!

TO ORDER TURN TO THE FORM ON PAGE 141

THE MICRO USER MAIL ORDER OFFERS

Drive into a new dimension!

Grand Prix Construction Set from Superior Software is an all-action racing game with a difference.

Using the built-in editor you can design your own circuits by choosing from a range of bends, chicanes, hump-backed bridges and more.

But to get you started there are 18 pre-defined race-tracks for you to try out.

Together with the one or two-player option, and the spectacular split-screen view, this has to be one of the most exciting games for the BBC Micro in a long time!

'The construction set is excellent, and the race section...has sufficient thrills and spills to keep you on the edge of your seat.' – ***James Riddell,*** **The Micro User,** ***June 1987***

SAVE UP TO £5

SAVE UP TO £7

Play football's first interactive computer and board game!

Brian Clough's Football Fortunes is a exciting football management game with a difference – it combines an excellent range of computer-based features with a fascinating board game.

The result for the players is a package which is as much fun and as skillful to play as other best-selling board games, combined with the flexibility and speed of play which only a computer can supply.

Up for the Cup!

CONTENTS INCLUDE

- BBC software
- Playing board
- Five coloured counters
- 112 Player cards
- 10 spare Player cards
- Six immunity cards
- Pack of money

FEATURES

- Two to five players
- Four skill levels
- Variable game length
- Computer die
- Teleprinter
- Constantly updated league tables
- Assessments of each manager's performance

'A great family game – and no crowd trouble!'
Niels Reynolds, **The Micro User,** ***July 1987***

Suitable for	Product	Format	RRP	Special reader offer	YOU SAVE	Offer including subscription	YOU SAVE
BBC Micro	Grand Prix Construction Set	Tape	£9.95	£7.95	£2	£19.95	£5
BBC Micro	Grand Prix Construction Set	5.25" Disc	£11.95	£9.95	£2	£21.95	£5
BBC Micro	Grand Prix Construction Set	3.5" Disc	£14.95	£12.95	£2	£24.95	£5
BBC Micro	B. Clough's Football Fortunes	Tape	£14.95	£11.95	£3	£22.95	£7
BBC Micro	B. Clough's Football Fortunes	5.25" Disc	£17.95	£14.95	£3	£25.95	£7

TO ORDER TURN TO THE FORM ON PAGE 141

THE MICRO USER

MAIL ORDER OFFERS

ORDER FORM

Overseas orders:
ALL GOODS NOW SENT AIRMAIL

Valid to September 30, 1987
Orders subject to availability
Please tick items in box below

Annual subscription

£ p

UK	£15	*2001*
Europe (incl Eire) : Surface	£25	*2365*
Overseas Surface	£31	*2366*
Overseas Air	£42	*2004*

Commence with _____ issue

Renewals

UK	£15	*2002*
Europe (incl Eire) : Surface	£25	*2114*
Overseas Surface	£31	*2367*
Overseas: Air	£42	*2113*

Annual subscription for cassettes and discs

	UK	Europe/Eire Overseas	
BBC 'B' cassette	£35	£45	*2005*
5.25" disc 40T	£50	£60	*2006*
5.25" disc 80T	£50	£60	*2007*

Commence with _____ (state month)

Renewals

	UK	Europe/Eire Overseas	
BBC 'B' cassette	£35	£45	*2009*
5.25" disc 40T	£50	£60	*2010*
5.25" disc 80T	£50	£60	*2111*

Grand Prix Construction Set

NEW

	With sub *	Without sub	
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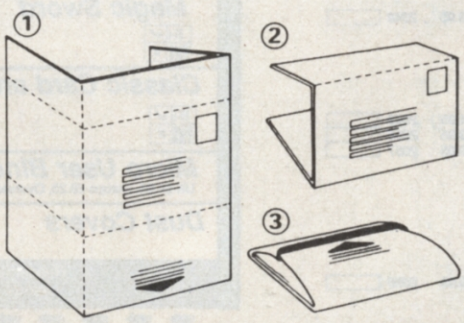

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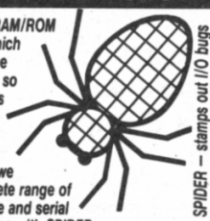

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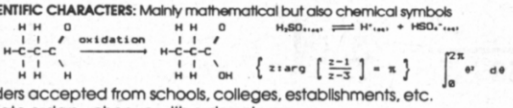

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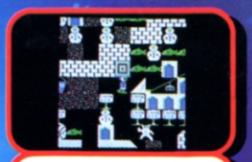

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